Galvanizing an Important Operation in Range Boiler Production

Plant of Detroit Manufacturer Has Capacity for Turning Out 700 Household Water Heating Tanks a Day—Sheet Stock Is Cut, Formed, Punched and Riveted by Special Machine Equipment —Some Boilers Also Arc Welded—Two Galvanizing Pots Are Maintained at 850 Degrees Fahr. by Modern High Pressure Gas Burners —Ton and a Half of Work Is Coated in an Hour

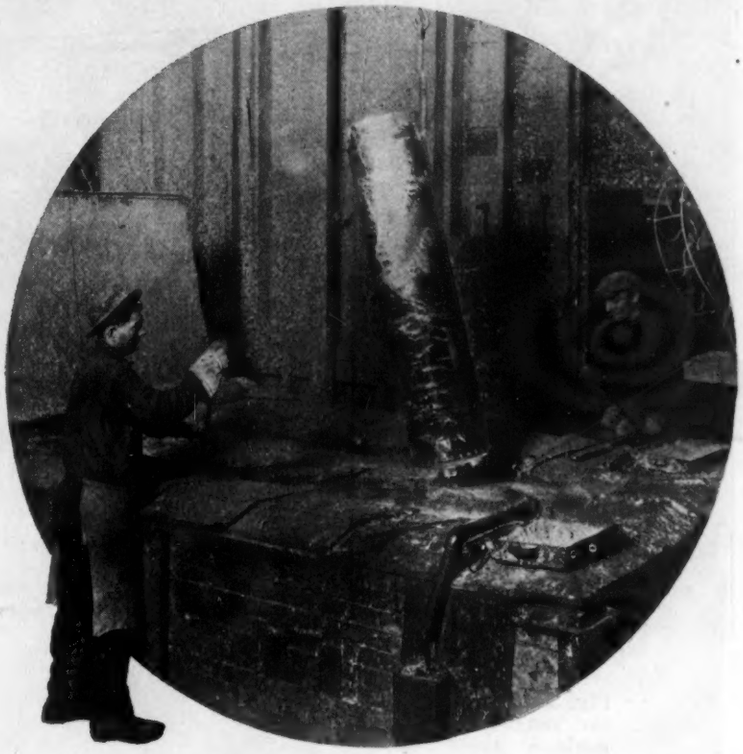


Fig. 1—Galvanizing a steel range boiler

TO YOUNGER Americans the range boiler for heating and storing water always has seemed a necessity but to their fathers and grandfathers it once was a luxury. A generation ago the family's needs for hot water were supplied by the tank built into the side of the kitchen stove. Later, when pipes were used to carry water around the home, the range boiler or tank, was introduced and was placed adjacent to the stove to accommodate a heating coil which passed through the firebox. When domestic heating furnaces and gas heaters were developed, the boiler was transferred to the basement where it still remains.

Millions of these boilers are in use in homes throughout the country. Their present low cost has been made possible by standardization of manufacture and sizes and the application of mod-

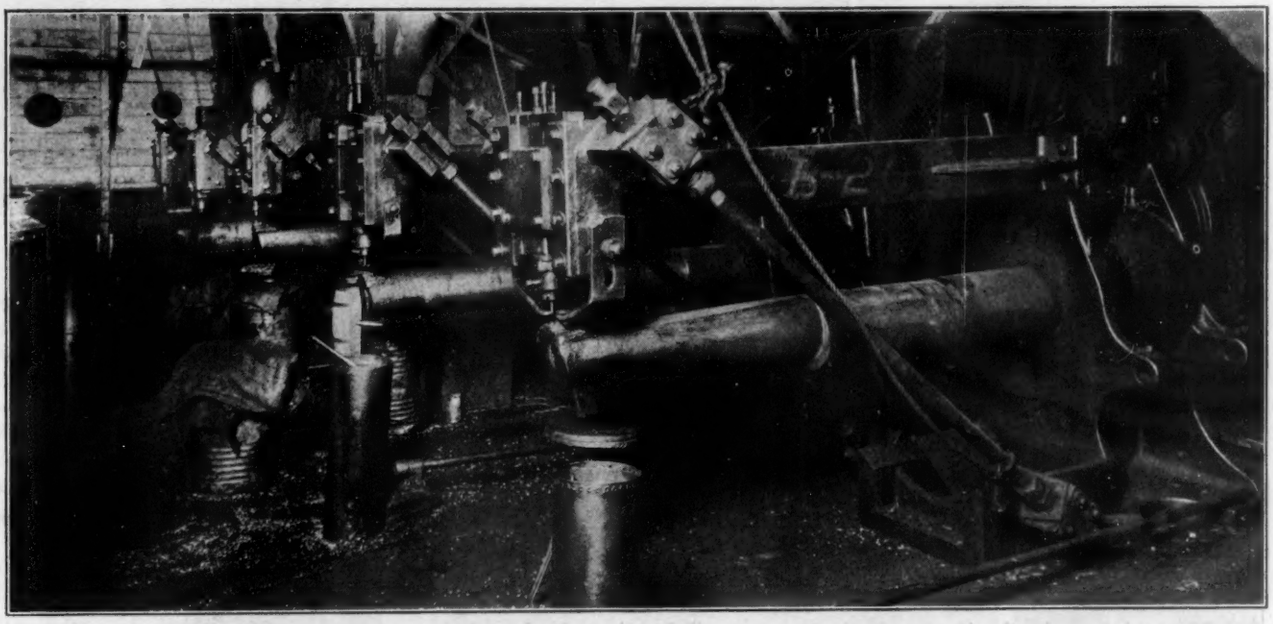
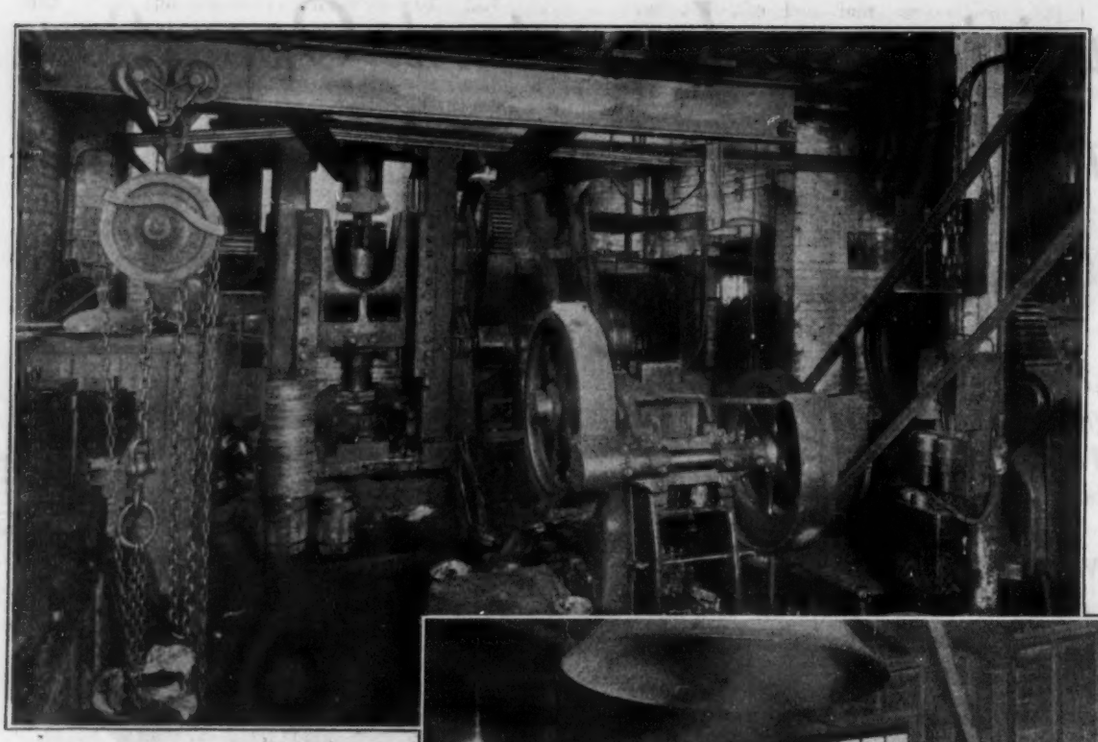


Fig. 2—Horn presses are employed for riveting the shell seam and riveting in the heads and bottoms



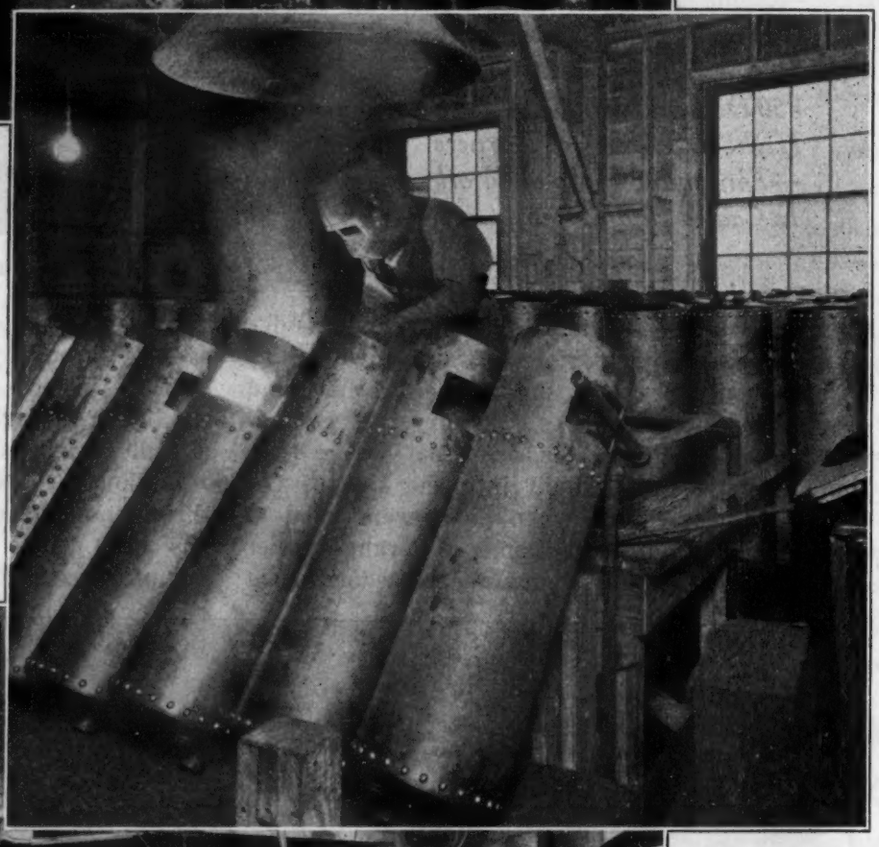
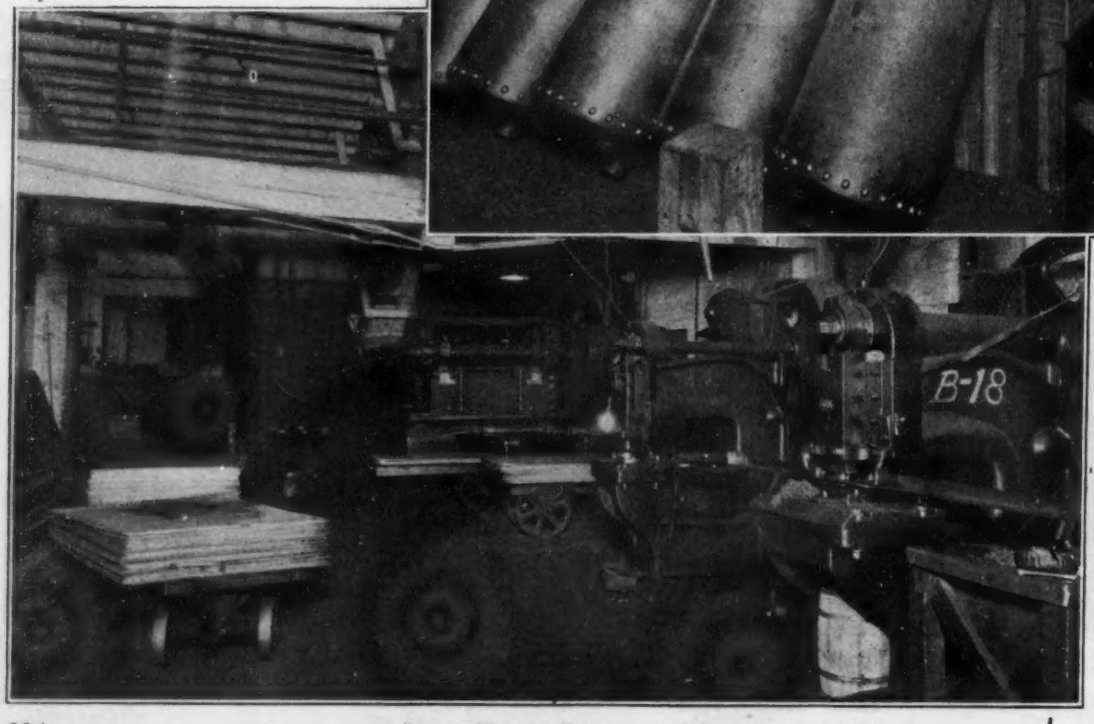


Fig. 3 (Above)—Heads for range boilers are made in these blanking, punching and drawing presses. Fig. 4 (Right)—Some of the boilers have their seams welded, the electric arc method being used as shown. Fig. 5 (Below)—In this department the shell sheets are sheared, gang punched for riveting and rolled to shape. Spud holes are made with a gap press.



ern machinery. In 1924, there were 130 sizes and types of boilers in production, but through efforts of the division of simplified practice, department of commerce, co-operating with the manufacturers, that number has been reduced to 13.

One of the oldest and largest manufacturers of range boilers is the Detroit Range Boiler & Steel Barrel Co., which has been in business for more than 30 years, and has two large plants, one in Toledo, O., and one in Detroit. The latter plant has a daily capacity in excess of 700 range boilers. One type of boiler is made of steel containing a small percentage of copper, which greatly increases the resistance to action of rust and corrosion.

The heads and bottoms for the tanks are blanked or cut out of steel sheets in a press, and then convexed and flanged cold in a powerful press equipped with the proper die and plunger. Holes for outlets and inlets are punched in a punch press and the spuds put in with a power press. Equipment for performing these operations is shown in Fig. 3.

The sheets for the shells come cut approximately to size, consequently they must be sheared to exact dimensions. Side seam rivet holes are punched in gang presses while spud holes are punched in the shells in a gap punch. The spuds are put in with a power press. Fig. 5 shows the department for handling the shell sheets. The shell seam then is riveted on horn machines which are shown in Fig. 2. The rivet holes in the heads and end of the shells are punched simultaneously and then riveted on a long horn machine. The bottoms are similarly put in on a short horn machine, the rounded portion protruding into the boiler.

The seams of many of the boilers are welded to insure absolute water tightness in case of rough handling. As shown in Fig. 4, the electric arc method is used, motor-driven generators supplying the current, and expert welders doing the welding. To remove all scale from the outside and inside surfaces, the boilers are then pickled in a diluted sulphuric acid bath of about 75 per cent strength. This bath is kept at a temperature of about 160 degrees Fahr., and it takes 15 minutes on the average to clean the steel. The pickling room is shown in Fig. 6.

One of the most important operations in this plant is the galvanizing, and considerable progress has been made in this department during recent years. Galvanizing is done with spelter or commercial zinc, a heavy, even coat being put on by the hot-dip process. Two galvanizing pots are used, each 14 feet long, 3 feet 2 inches wide and 4 feet deep. These pots are fired by gas, the burner equipment being manufactured and installed by the Surface Combustion Co., New York. The bath is held at about 850 degrees Fahr., and galvanizing is done at an average rate of 3000 pounds per hour, with a gas consumption of approximately 1500 cubic feet per hour. For every hundred pounds of steel dipped, 10 pounds of fresh zinc is added. One of the galvanizing pots is shown in Fig. 1 with a boiler being removed from it while Fig. 7 shows the hoist employed to lift out the boilers.

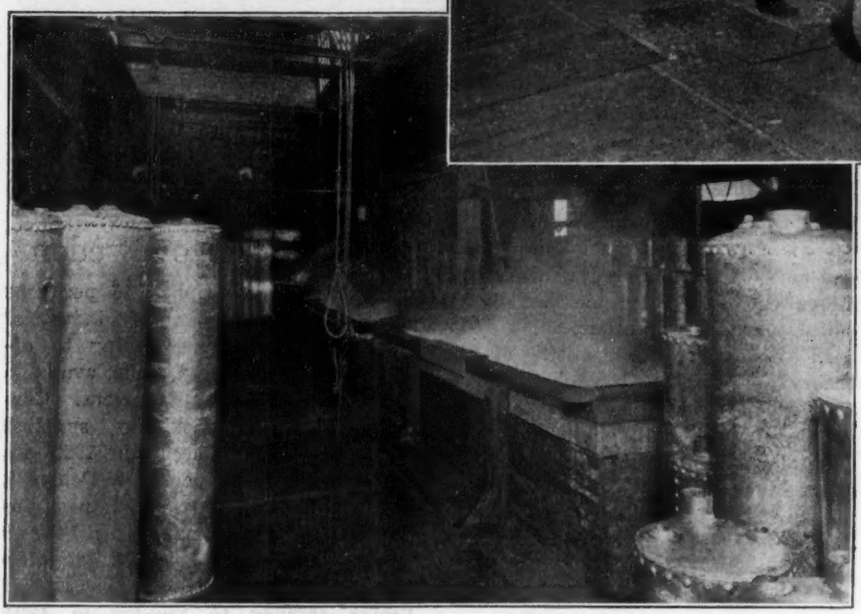


Fig. 6 (Lower left)—Preparatory to galvanizing, the boilers are immersed in dilute sulphuric acid for about 15 minutes to remove all scale. Fig. 7 (Upper right)—After being galvanized the tanks are lifted from the pot with this hoist. The testing department is shown in the rear

Features of the system of firing the pots are control, uniformity and even distribution of heat, together with lower fuel, labor and metal costs, prolonged life of kettles, uniformity of product and increased capacity. The Surface Combustion Co. manufactures both high pressure and low pressure equipment, the type used being governed by local conditions. In the high pressure system, which is the one used in this plant, the gas is raised from line pressure to about 10 pounds, and air in just the correct amount for complete combustion is entrained through patented venturi inspirators. In the low pressure system, air is boosted to one or two pounds pressure by a pressure blower, and gas, which has been reduced through a governor to atmospheric pressure, is sucked in and proportioned in the same kind of venturi inspirator.

The correct ratio of gas and air is automatically maintained regardless of volume of flow which is manipulated by means of a single valve. The homogeneous mixture of air and gas is fired into refractory beds,

which are brought to incandescence. Uniform heat is, therefore, delivered in radiant form, which insures long life for the kettles. Naturally, fuel economy results from the automatic proportioning as the control of the mixture is entirely independent of a furnace operator, and duplication of results becomes a daily routine.

After the range boilers are galvanized, the spuds are threaded for the pipe inlets and outlets. The boilers are then subjected to a hydrostatic test at a pressure ranging from 125 to 300 pounds per square inch. This test complete and satisfactory, the tanks are placed in stock and ready for shipment.

Produces Ductile Welds by New Arc Processes

WORKING in different laboratories hundreds of miles apart, two research scientists of the General Electric Co. have developed methods for producing ductile welds using the electric process. Both of the methods, similar in some respects, mark an important step in the utilization of the heat of electric arcs in the joining of metal parts or the building up of metal structures. One was developed in the Schenectady, N. Y., research laboratory by Dr. Irving Langmuir and the other in the Lynn, Mass., laboratory by Peter Alexander.

In both processes, air is excluded from the metal by means of a bath of hydrogen or other gas. The formation of oxides and nitrides in the weld metal thus is prevented, and the fused metal is as strong and ductile as the original metal. The method developed by Dr. Langmuir is to pass a stream of hydrogen between two electrodes. The heat of the arc breaks up the hydrogen molecules into atoms and these combine again a short distance in front of the arc into molecules of the gas, and in so doing liberate an enormous amount of heat, so that much higher temperatures can be obtained with this than with the usual welding methods. Since atomic hydrogen is a powerful reducing agent, it reduces any oxides which might otherwise form on the surface of the metal. Alloys containing chromium, aluminum, silicon or manganese can thus be welded without fluxes and without surface oxidation.

The process developed in the Lynn laboratory by Mr. Alexander is based on the utilization of the chemical and physical properties of hydrogen and other gases in their molecular state. This process aims primarily at the prevention of the formation of the nitrides and oxides in the arc-deposited metal, which limit the ductility of the usual arc welds.

In this process, the arc is struck between the metallic wire or carbon used as one electrode and the plate or work to be welded used as another electrode. The crater of the arc always is on the work to be welded. The gaseous atmosphere is supplied in a form of a stream around the arc. Pure hydrogen, water gas, hydrogen-nitrogen mixtures, anhydrous ammonia, methanol vapor and some other suitable gases can be used, according to the nature of the work. The hydrogen-carbon monoxide mixtures were suggested by Prof. Elihu Thomson; water gas and methanol are examples of such mixtures.

Mr. Alexander's process makes arc welding more efficient and suitable for fields which at present are out of its reach: Low carbon steel, alloy steels and most of the nonferrous metals and alloys can be welded successfully in suitable gaseous mixtures.

In this brief article, little of the theory or technique have been given. Consequently, in an early issue, IRON TRADE REVIEW will publish a more comprehensive discussion of these two interesting methods of welding. Apparatus will be described and specimen welds of high ductility will be shown as illustrations.

Will Install Laboratory

A metallurgical laboratory, 45 x 59 feet, will be built at the Wood works of the American Sheet & Tin Plate Co., McKeesport, Pa. Two similar laboratories also are planned for Farrell, Pa. and Gary, Ind. works of the company. Contracts for building at McKeesport have been let to the Concrete Steel & Bridge Co., Clarksburg, W. Va.

Poland Buys More Tools

Poland's imports of industrial machinery in 1925 showed an increase of about 35 per cent over those for 1924, according to L. J. Cochrane, assistant trade commissioner at Warsaw. Imports of metalworking, woodworking and textile machinery in 1925 totaled $5,940,000 against $4,413,000 during the previous year, the increase being $1,527,000. This improvement was due to gains made during the first months of the year, for after August increasing business depression, currency fluctuation and credit shortage, as well as governmental restrictions, sharply limited imports.

Plan Multiple Launching at Newport News

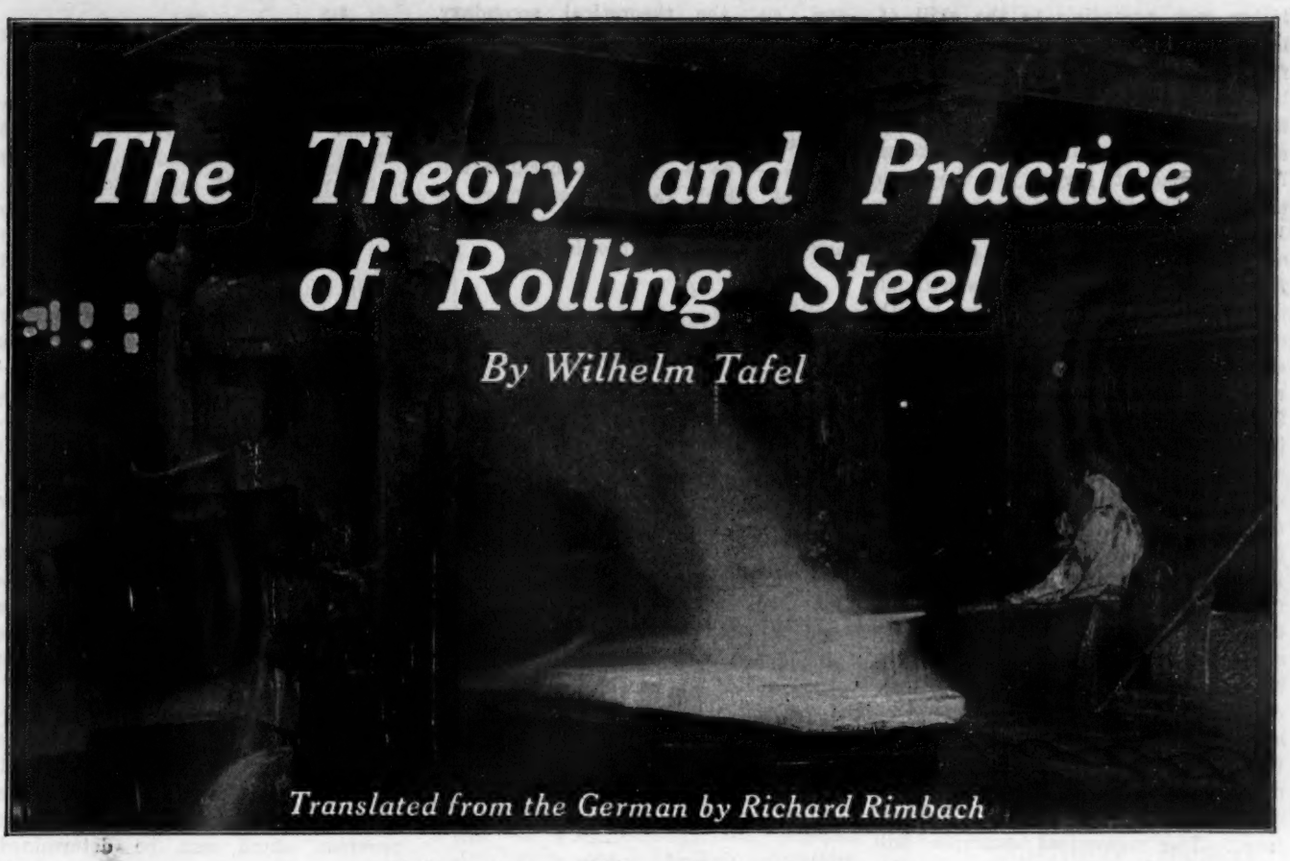
Newport News Shipbuilding & Dry Dock Co., Newport News, Va., is issuing invitations to an unusual multiple launching March 20, when nine vessels of five types will be launched and keels will be laid for three new craft. The program provides a launching or keel-laying every few minutes from 11:30 oclock to 2:45 oclock.

The vessels to be launched include house barges, yachts, car floats, a dredge and a freight and passenger steamer. A brochure containing the program of the day describes the vessels and gives some account of the yards of the company, and a list of points of interest in the vicinity of Hampton Roads and Newport News.

Sells More to Sweden

United States supplied 18 per cent of Sweden's imports of industrial machinery in 1924, according to official figures recently made available by the Swedish government. Germany, aided by proximity, supplied 44 per cent, although in 1923 its share had been 53 per cent. Denmark and Great Britain ranked next to the United States, supplying 14 and 13 per cent, respectively. Valuation of all machinery which the United States shipped to Sweden in 1924 was approximately $807,000, as compared with $714,000 in the preceding year. Of metalworking machinery, United States supplied 28 per cent while Germany supplied 54 per cent.

Sault Ste. Marie works of the Union Carbide & Carbon Co., New York, has operated a full year to Jan. 9, 1926 without a lost time accident, according to the *National Safety News*. The Soo plant employs an average of 450 men, some departments working 24 hours a day. Competition among plants of the company for safety records resulted in high interest by the employes of the Soo works making the no-accident year possible.



The Theory and Practice of Rolling Steel

By Wilhelm Tafel

Translated from the German by Richard Rimbach

Chapter IV—Continued

IN DESIGNING a new wire train or in rebuilding an available unit it is customary to start with the production desired an hour in the principal dimensions to be rolled. For example, suppose the mill is to roll 350 tons of 0.197-inch diameter wire in 24 hours, that the loss of time due to working pauses amounts to 10 per cent and that for 10 per cent of the time no steel is in the rolls. To attain this production more passes are provided in the last stand than are given by the calculations so that at least one pass always is available to enter stock.

The highest revolution per minute with a roll diameter of 11.024 inches in the finishing stand is 600 which corresponds to an exit speed of (11.029 x 3.1416 x 600) ÷ (12 x 60) or 28.8 feet a second. A foot of a 0.197-inch round weighs 0.104 pound. Therefore, a pass will produce without interruption 3600 x 28.8 x 0.1 or 10,368 pounds in an hour. If the working and pass pauses are considered each pass in 24 hours will produce 24 x 0.8 x 10,368 or 90 tons. To obtain the desired production four wires are run through the finishing stand simultaneously.

The mill chosen is of the semicontinuous type. To determine the rolling speed in the next to the last stand reduction relations, the elongation and the size of the loops first must be decided. The former are received from the pass design. The pass dimensions are entered in line 3 the pass cross-section q in line 4 and the elongation n in line 6 in Table V. For the last pass No. 20 the length of stock, l_{20}, if to be delivered in coil form will weigh 130 pounds and will be 130 ÷ 0.1 or 1300 feet long. This is entered in line No. 5. The number of wires m in line 15 is determined as four.

Speed Gain Is Omitted

The circumference speed of the roll or the exit speed of the wire in the finishing stand is 28.8 feet a second as previously calculated. The slight speed gain is neglected because it is nearly the same for all passes. The entrance speed, e_{20} in line 9, is 28.8 ÷ 1.13 or 25.6 feet a second. The length of the stock in front of the finishing pass is smaller than behind the roll by an amount equal to the elongation or $l_{20} \div (n_{10}$ to $_{20})$. As this length must enter the roll at the same speed it leaves the previous stand $e : a$, therefore has the same relation as $(l \div n : l$. From this $e = (a \div n)$ is derived. The roll diameter D is as 11.024 inches and the speed 600 revolutions per minute; The time required for a pass t_{20} in line 11 is $\frac{l_{20}}{a_{20}} = \frac{1300}{28.8} =$ or approaches 45.5 seconds. Finally the volumes are calculated q x n x e x m, which are drawn into the particular roll per second, or 0.029 x 1.13 x 25.5 x 12 x 4 = 40.89 cubic inches. For the finishing pass the unknown quantity is the size of the loop. The shorter the loops, the warmer the finished wire will be. This in addition to the saving of the pass, and to the uniformity of the temperature of the front and rear end, is desirable. On the other hand a certain size of loops should be maintained because otherwise the tendency for the end to whip will be too great. This lower boundary of the loop trough is given as 39.4 feet which is equal to 78.8 feet of wire length by the experienced, it is divided first into the length of wire which a roll, x, throws out in the rolling time, t_x, in excess of that taken by the roll $x + 1$. This is designated as the secondary or theoretical loop length. It amounts to t_x $(a_x - e_x + 1)$.

The second part called the primary length of loop consists of about 15.7 to 23.6 feet which is thrown out by the roll x, until the catcher guides the forward end with the tongs, and enters it in the roll, $x + 1$. In the

latter case according to the skill of the catcher a primary loop length from 15.7 to 39.4 feet is available. both kinds of loops are assumed as 23.6 feet for simplicity. The loop should not be smaller nor in excess of the amount given by the loop trough. These troughs have a 10 to 15 per cent slope. The wire loops of each stand can be directed away from the set in these troughs without touching the other rolls. The length of this trough is estimated between 49 and 82 feet, which therefore corresponds to a total loop length of 98.4 to 196.9 feet. If a loop length is chosen which must lie between 23.6 and 196.9 feet, the entrance speed of the last pass is determined by the exit speed of the previous pass: from this result and the elongation, its entrance speed is determined; from this and the next loop length, the exit speed with the third last stand is determined, etc. However, best results are not obtained by calculating on this basis. The rolling speeds are not made dependent on the desired size of loops, but are made to come within the foregoing determined limits which length of loop. The numerical example will make this clear.

What exit speed, a_{19}, is necessary in the oval pass No. 19 to give the theoretical length of loop s_{th} when the wire length is 98.4 feet?

Ordinarily where l_x is the wire length of the pass x; t_x, the pass time; a_x, its exit; e_{x+1}, the entrance speed of the following pass; and, s_{th}, the theoretical secondary loop length between the passes x and $x+1$, the relation $(l_x \div a_x) = t_x$ holds because the rolling speed multiplied by the time is equal to the length of wire rolled. Moreover, $t_x\,(a_x - e_{x+1}) = s_{th}$ because the amount which the roll x brings is more than the roll $x+1$ takes away and this goes into the loop.

$$\text{Thence:} \quad \frac{l_x}{a_x}(a_x - e_{x+1}) = s_{th}$$

$$l_x - l_x\frac{e_{x+1}}{a_x} = s_{th}$$

$$a_x\,(l_x - s_{th}) = l_x\,e_{x+1}$$

$$\text{Thence:} \quad a_x = e_{x+1}\frac{1}{1 - \frac{s_{th}}{l_x}}$$

With this last formula in Table V, the exit speed of the previous is calculated from the entrance speed of the following pass.

If we call the reduction in per cent A, the elongation a_x, as was shown previously equals $e_x n$. Therefore,

$$e_x \frac{1}{1 - \frac{A}{100}}$$

This substituted in the foregoing equation for a_x gives

$$e_x \frac{1}{1 - \frac{A}{100}} = e_x + 1\,\frac{1}{1 - \frac{s_{th}}{l_x}}$$

Consequently then $e_x = e_{x+1}$ if $A = \frac{s_{th}}{l_x} - 100$. In other words the entrance and exit, or, roll or circumference speeds of two rolls then become equal, if as large a percentage of the wire length goes into the loop, as amounts to the reduction between the two passes. It means, that with two rolls having equal diameters and revolutions per minute as much wire goes into the secondary loop during its passage through the first roll, as the reduction amounts to in the second roll. Or if all over a size of loop corresponding to the reduction is permitted all stands would have equal rolling speeds, therefore equal diameter and revolutions per minute. Or thirdly, the circumference speed must be diminished. Consequently with the same revolutions per minute the diameter of the previous roll, in the same relation as the percentage size of the loop, should be smaller than the reduction.

According to the foregoing suggestions the size of the loops can be calculated with a given rolling speed, or for a given rolling speed and a desired loop the exit speed in the previous stand can be determined. In addition the roll train can be subdivided into different groups with different revolutions per minute, and the roll diameter stepped inside the groups. A theoretical size of loop, which appear desirable for the different passes then is included in the table. About 10 per cent of the wire length is allowed to go into the sec-

Table V

Calculation of Exit and Entrance Speeds, Roll Diameters and Revolutions Per Minute

1	Pass Number.....	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
2	Pass Shape.....	Round	Oval	Square	Oval	Square	Oval	Square	Oval	Square	Oval	Square	Oval	Square	Oval	Square	Oval	Square	Square	Square	Square
3	Pass Dimensions in Inches.....	0.197	0.335 x 0.150	0.197	0.472 x 0.157	0.256	0.630 x 0.197	0.344	0.846 x 0.285	0.482	1.240 x 0.413	0.709	1.850 x 0.591	1.083	2.835 x 0.984	1.772	4.331 x 1.693	3.150 x 2.953	4.528 x 2.953	4.528 x 4.331	6.102 x 4.331
4	Cross section in sq. in. q=.....	0.029	0.033	0.039	0.050	0.066	0.082	0.119	0.160	0.233	0.310	0.504	0.729	1.178	1.860	3.105	4.867	9.300	13.330	19.530	26.350
5	Rod length in feet l=	1300	1148.3	1000.7	756.9	700.8	563.0	324.8	242.8	164.0	113.2	77.1	52.5	32.8	21.3	12.5	7.9	4.96			
6	Elongation .....n=	1.13	1.15	1.27	1.33	1.25	1.45	1.34	1.48	1.45	1.47	1.45	1.61	1.58	1.69	1.55	1.9	1.45	1.46	1.35	
7	Actual loop length.... Seff	114.8	114.8	123.0 (114.8)	98.4	102.7	109.5	75.1	42.6	55.1 (52.5)	43.6 (45.9)	39.4	65.6	26.2							
8	Secondary loop..... Length $S_{th} = S_{eff}$-19.7 ft.	95.1	95.1	103.3 (95.1)	78.7	83.0	89.8	55.4	22.9	35.4 (32.8)	23.9 (26.2)	19.7	45.9	6.5							
9	Entrance Speed e in Ft./Sec.....	25.6	24.3	21.3	18.2	16.7	14.1	14.4	12.6	10.2	10.2	10.2	10.2	8.1	4.7	2.9	1.5	1.0	0.67	0.48	Bloom
10	Exit Speed a in Ft./Sec.....	28.8	27.9	26.9	24.6 24.3	21.0	20.3	19.5	18.7	14.8	14.8 (14.3)	14.8	16.4	12.8	7.87	4.59	2.85	1.44	0.98	0.66	0.47
11	Pass Time in Sec. $t = \frac{l}{a}$	45.5	41.5	38	31.5 32	27.7	23	16.6	13	11	7.7 (8)	5.2	3.2								
12	R. P. M.....	600	600	600	600	440	440	440	440	300	300	300	300								
13	Roll Diameter D in Inches.....	11.024	10.630	10.236	9.449 (9.252)	11.024	10.630	10.236	9.843	11.220	11.220 (10.827)	11.220	12.598								
14	Volume per second with 1 wire in cu. in. = $V/m = q \times a$=.....	10.25	11.11	12.51	14.65	16.60	20.14	28.07	35.70	41.19	60.41	89.09	143.40								
15	Number of wires m....	4	4	4	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
16	Volume per second in cu. inches, delivered by Roll V=	41.00	44.44	50.04	43.95	49.80	40.28	56.14	71.40	41.19	60.41	89.09	143.40								
		Group III.				Group II.				Group I				CONTINUOUS MILL							

NOTE: The figures above those in parenthesis, denote changes made according to calculations given in the text.

ondary loops. Then $\frac{e_{20}}{0.9} = a_{19}$, $e_{19} = \frac{a_{19}}{n_{19}/_{19}}$, $\frac{e_{19}}{0.9} = a_{18}$, etc.

The relation of loop to wire length now will conform to the equation just given for pass No. 20 backwards to No. 9 which in Table VI are given for the designated entrance speeds e, exit speeds or rolling speeds a, pass times t $(= l/a)$ and effective loop lengths $s_{eff} = t_x\ (a_x - e_x + {}_1) + 19.7$. The elongations and wire lengths necessary for the calculation are taken from Table V.

The loop lengths would correspond, but the rolling speeds, a, fall so rapidly that it will be impossible to hold them even in a triple stepped train with three different revolutions per minute without making the difference of the diameters too large. Table VI, therefore, is an example of where the desired loop sizes must be enlarged with respect to what is practically possible, that is, by the rolling speeds attainable by a two-thirds fold stepping.

How Table Is Determined

In considering the other extreme from the standpoint of the rolling speed wire trains which have several alternating mills arranged two-high in a row are taken. These have equal revolutions per minute and equal or approximately equal roll diameters. Our table is determined by the same rolling speed, a, in every case and takes the following form: The loop lengths with the rolling speed, a, the same are presented in Table VII.

Elongation and wire lengths for the calculation are taken from Table V. Here we receive between passes 18 and 19 and 17 and 18 the loops are in excess of those assumed. With the first passes from 9 to about 17 the rolling speed, 28.8, will be so high that the roller will not be able to catch the piece securely.

The higher rolling speeds are used only where the capacity demands, regardless of the difficulty of catching or the large amount of work consumed running light and the wear of the necks. In a wire mill, as much material must be fed per unit time at one end, as comes out at the other end or in this case as many cubic inches of steel, as the finishing roll turns out per second. The latter amount is with four wires of 0.029 square inches cross-section and 28.8 feet a second exit speed or 4 x 28.8 x 12 x 0.029 = 40.89 cubic inches.

The same amount per second must enter in the first roll. If less were to go through, the production would no longer be determined by the finishing roll but by the first stand. If more enters, the excess must be choked down by pauses in entering the individual billets. The condition applying to the entering stand of a wire mill also applies for every intermediate stand. The same amount of material should be fed per second, as goes through the finishing roll. If less goes through any stand, the production of the whole train is curtailed. If more passes go through a stand, the number of pauses in entering the stock is increased. The best practice is to let the particular rolls run slower, because the high revolutions per minute would otherwise consume power and wear the necks. Let us look at the table of figures with the same rolling speeds. Material going through a mill with the rolling speeds the same amounts to q x 28.8 times the number of wires. Table V shows that 40.866 cubic inches are attained in Pass 14. Then 1 x 28.8 x 12 x 0.119 = 41.191 cubic inches. Pass 13 gives 28.8 x 12 x 0.169 = 54.921 cubic inches. Therefore, the excess speed is:

$$\frac{54.921 - 41.191}{54.921} \times 100 = 25 \text{ per cent.}$$

This speed is higher with passes 12 to 9. Material can be worked with such trains, but they waste power and make the work unnecessarily difficult for the roller.

Where the rolling speed in the last passes is based on the desired size of loops the corresponding exit speed is obtained from the equation:

$$a_x = e_x + 1\ \frac{1}{1 - \frac{8th}{l_x}}$$

Therefore for Pass 19 we have

$$e_{20} = \frac{28.8}{1.13} = 25.6$$

$$a_{19} = 25.6\ \frac{1}{1 - \frac{95.1}{1148.3}} = 27.9 \text{ ft/sec.}$$

$$\text{from this } e_{19} = \frac{27.9}{1.15} = 24.3$$

Table VI

Rolling Speeds with a Loop 1-10 the Wire Length

Pass No....	20	19	18	17	16	15	14	13	12	11	10	9
e = ...	25.6	24.7	21.6	18.0	16.1	12.3	10.2	7.68	5.87	4.43	3.39	2.34
a = ...	28.8	28.3	27.4	23.9	20.0	17.9	13.7	11.3	8.53	6.53	4.92	3.77
t in sec. = ...	45.5	40.4	36.4	32.3	29.1	26.2	23.7	21.4	19.2	17.3	15.65	13.9
s_{th}.....	114.8	100.1	77.7	61.7	46.9	32.5	24.3	16.4	11.3	7.71	5.25	
s_{eff}.....	134.5	119.8	97.4	78.1	66.6	52.2	44.0	36.1	31.0	27.4	24.9	

Table VII

Loop Lengths with Rolling Speed the Same

Pass No.....	20	19	18	17	16	15	14	13	12	11	10	9
e = ...	25.6	24.9	22.6	21.8	23.3	19.7	21.7	19.7	19.7	19.7	19.7	17.7
a = ...	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
t in sec.....	45.5	40	34.6	27	20	16.3	11.3	8.4	5.7	3.9	2.7	1.8
s_{eff} in ft.....	150.9	156.8	188.0	160.8	110.6	123.4	80.9	72.2	55.4	44.3	36.1	

Studies Benefication of Southern Ores

An investigation is being conducted at the Southern experiment station of the bureau of mines, Tuscaloosa, Ala., for the purpose of developing means of treating low-grade high-silicon iron ores of the South and particularly of the Birmingham district, to render them available for blast furnace use. With the development of satisfactory methods of treatment will come a large increase in the iron ore reserves. The purpose of the studies is to remove part of the insolubles of high-silica red ores and specular gray hematites with a minimum loss of iron, thereby increasing the iron content in the product going to the blast furnace; to develop a coarse treatment for the removal of clay, gravel, and chert from low-grade brown ores; and, to remove enough carbon and insoluble material from flue dust to make a concentrate of sufficient iron content for blast furnace use.

Section VII of the A. S. M. E. boiler construction code, consisting of "Suggested Rules for the Car of Power Boilers," has been formally approved and is now on the press. Demand for the new code is great from all parts of the world, even in advance of publication and every effort is being made to hasten its issuance. It will comprise a pamphlet of about 80 pages and probably will be ready for distribution in March.

Plan Standardization of Pipe

Sectional Committee on Standard Specifications for Cast Iron Pipe Being Formed To Revise Specifications

A STANDARDIZATION project of far-reaching importance is about to be inaugurated through the formation of a representative committee on cast iron pipe, which will undertake a general program of unifying existing specifications for cast iron pipe into a consistent set of nationally recognized specifications. This committee, which will be officially known as the sectional committee on standard specification for cast iron pipe is being sponsored by the American Gas association, American Society for Testing Materials, American Water Works association and New England Water Works association and will function under the procedure of the American engineering standards committee.

This development is the outcome of the submission two years ago by the American Gas association of its standard specifications for cast iron pipe and special castings to the American engineering standards committee for their approval as American standard specifications. It became evident that consideration of these specifications for such approval would involve the standardization of cast iron pipe in general, and at a conference held under the auspices of the American engineering standards committee, which was widely represented by industries producing and using this product, it became clear that whereas dimensional standardization was involved principally in the specifications for gas pipe, a broader treatment of the whole problem was essential if results of the greatest benefit were to be obtained. At this conference the need for a study of the quality of metal in cast iron pipe and the problem of suitable coatings were emphasized as of primary importance to waterworks engineers.

Recently developed methods of producing cast iron pipe must be taken into consideration. The American Gas association was willing to have the project broadened, and upon the recommendation of the conference the American engineering standards committee agreed to set up a broad program of standardization of cast iron pipe under its auspices and invited the American Gas association, American Society for Testing Materials, American Water Works association and New England Water Works association to sponsor the organization of a representative sectional committee to carry on the actual work of investigation and standardization.

The scope of the work has been defined as follows:

Unification of specifications for cast iron pipe, including materials; dimensions; pressure ratings; methods of manufacture (including such new developments as centrifugal casting), in-so-far as they may be necessary to secure satisfactory specifications; elimination of unnecessary sizes and varieties; consideration of the possibility of developing a co-ordinated scheme of metallic pipe and fittings applicable to all common mediums; and methods of making up joints in-so-far as they are determining as to the dimensional design of cast iron pipe.

The types of cast iron pipe to include: bell and spigot pipe; flanged pipe; flanged and bell mouth fittings and wall castings; pipe elbows, tees, Y's, return bends, and other fittings not now included in standard lists; cast iron pipe threaded for flanges or couplings; soil pipe and other light types of cast iron pipe and fittings. The standardization is not to include methods of installing pipe and similar matters, except as to the making up of joints in its relationship to the dimensional standardization of pipe and fittings, as noted above.

The sponsors have been engaged in the details of organizing the sectional committee, which will comprise representative producers and users of cast iron pipe, and independent technical experts.

Eleven technical societies and associations now are represented in the work of the committee. This stage of the work is practically completed and the sponsors have an-

Personnel of Sectional Committee on Specifications

American Gas Association

Walton Forstall, Engineer of Distribution, United Gas Improvement Co., Philadelphia.

H. E. Bates, Assistant Chemical Engineer, Peoples Gas, Light & Coke Co., Chicago.

C. C. Simpson, Jr., General Superintendent, Department Mains and Services, Consolidated Gas Co., New York.

American Railway Engineering Association

C. R. Knowles, Superintendent, Water Service, Illinois Central Railroad, Chicago.

C. P. Van Gundy, Water Engineer, Baltimore & Ohio Railroad, Baltimore.

American Society of Civil Engineers

F. H. Stephenson, Assistant Superintendent, Detroit Department of Water Supplies, Detroit.

American Society of Mechanical Engineers

J. E. Gibson, Manager and Engineer, Commissioners of Public Works, Charleston, S. C.

American Water Works Association

Thomas H. Wiggin, Consulting Engineer, 415 Lexington avenue, New York.

William H. Brush, Deputy Chief Engineer, Department Water Supply, Gas and Electricity, Municipal building, New York.

W. C. Hawley, Chief Engineer and General Superintendent, Pennsylvania Water Co., Wilkinsburg, Pa.

E. E. Wall, Water Commissioner, 312 City hall, St. Louis.

F. A. Barbour, Hydraulic and Sanitary Engineer, Tremont building, Boston.

National Fire Protection Association

C. W. Mowry, Director, Factory Mutual Laboratories, Boston.

U. S. Bureau of Standards

I. J. Fairchild, Bureau of Standards, Washington.

Underwriters' Laboratories

A. W. Claussen, Assistant Engineer, Underwriters' Laboratories, Chicago.

J. B. Clow & Sons

Kent S. Clow, Vice President, Chicago.

American Society for Testing Materials

Richard Moldenke, Consulting Metallurgist, Watchung, N. J.

S. R. Church, Technical Adviser, The Barrett Co., New York.

New England Water Works Association

F. A. McInnes, Consulting Engineer, Boston.

C. W. Sherman, Consulting Engineer, Boston.

W. R. Conard, Burlington, N. J.

Manufacturers Standardization Society of the Valve and Fittings Industry

C. R. Wood, 400 Chestnut street, Philadelphia.

American Cast Iron Pipe Co.

W. D. Moore, President, Birmingham, Alabama.

Glamorgan Pipe & Foundry Co.

A. M. Campbell, Lynchburg, Va.

Lynchburg Foundry Co.

W. G. Hammerstrom, Lynchburg, Va.

National Cast Iron Pipe Co.

A. M. Ford, Assistant Engineer, Birmingham, Ala.

R. D. Wood & Co.

Walter Wood, 400 Chestnut street, Philadelphia.

Warren Foundry & Machine Co.

Shellman B. Brown, Superintendent, Phillipsburg, N. J.

U. S. Cast Iron Pipe & Foundry Co.

N. F. S. Russell, President, Burlington, N. J.

D. P. Hopkins, Vice President, Burlington, N. J.

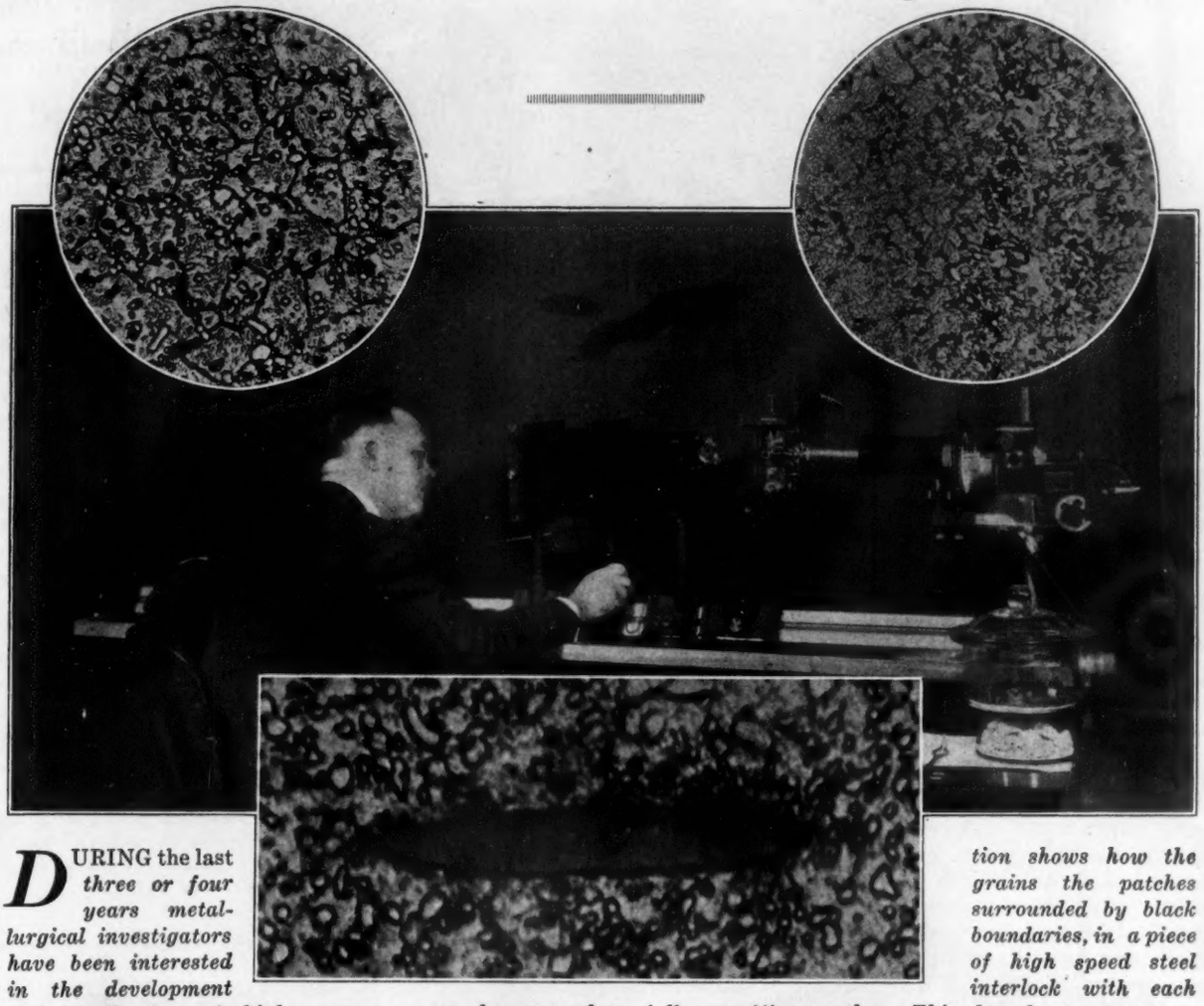
D. B. Stokes, General Sales Manager, Burlington, N. J.

nounced the personnel of the committee as shown in the accompanying box.

The formation of this committee brings together for the first time the major technical societies interested in the various phases of the cast iron pipe problem. It is anticipated that the co-operation of the producers and consumers upon the broad basis thus made possible will result in the development of national standards of quality and dimensions acceptable to all.

Plans for the formal organization of the committee in the near future are being made and will be announced shortly.

Studies Steel Structures at Record Magnifications

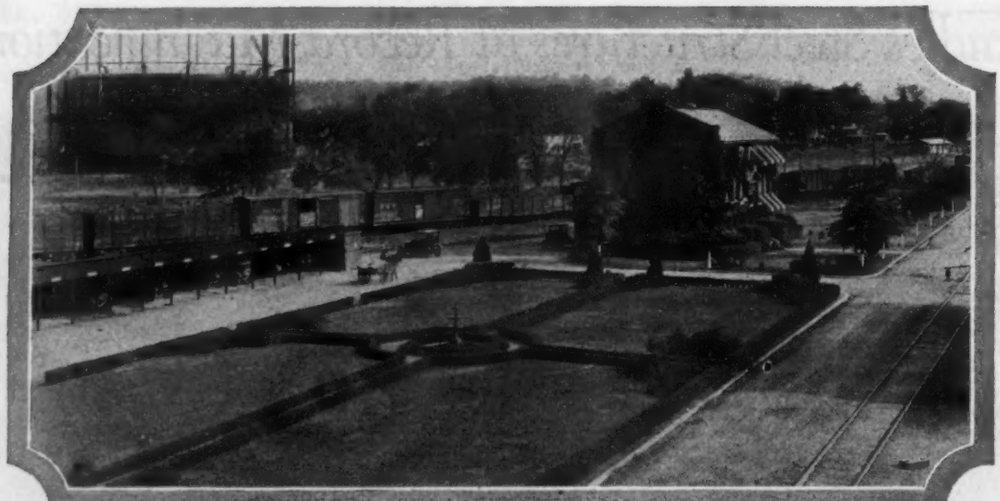


DURING the last three or four years metallurgical investigators have been interested in the development and application of high power magnification in photomicrography and during this period several notable papers on the subject have been presented before technical societies. One of the prominent investigators in this field is Robert G. Guthrie, chief metallurgist of the Peoples Gas Light & Coke Co., Chicago, who is shown with his equipment in the accompanying illustration. His most recent achievement is enlarging and photographing the structure of a piece of steel at 15,500 *diameters in a single projection. This is claimed to be a world's record.*

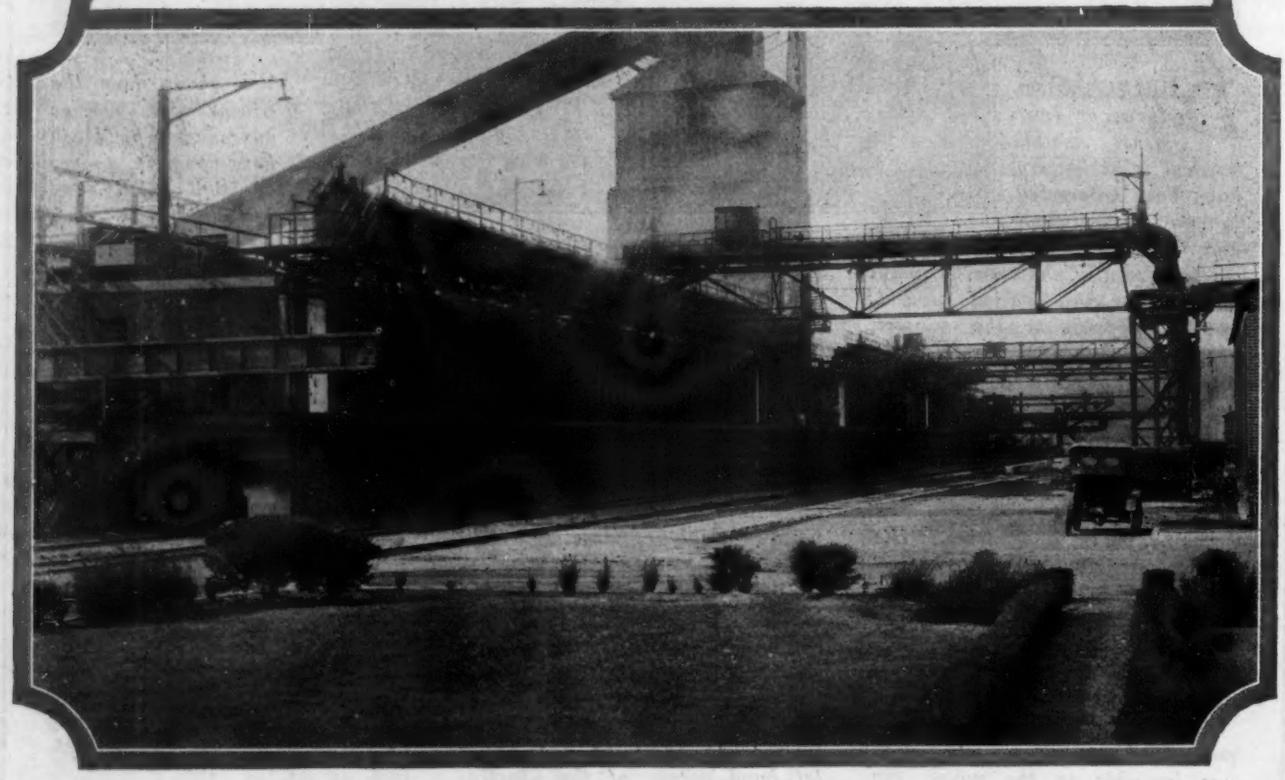
Mr. Guthrie's apparatus is so powerful that only objects which are invisible to the naked eye may be exposed to full magnification in order that the image will fit a photographic plate. Working under such high power lenses necessitates extreme accuracy. The apparatus is capable of separating and photographing structures as fine as 1/200,000-*inch thickness and a vibration of even this infinitesimal distance is enough to spoil an exposure which requires from* 30 *to* 90 *minutes. Mr. Guthrie examines samples of metal brought in by manufacturers and from tests suggests remedies for defects.*

Some of Mr. Guthrie's specimens are of interest. The photomicrograph inset in the upper left-hand corner of the illustration shows how the grains the patches surrounded by black boundaries, in a piece of high speed steel interlock with each other. This keyed structure explains why high speed steel is so hard. The photomicrograph in the upper right-hand corner shows why certain automobile piston pins were not performing as they should. The pins appeared satisfactory but the metallograph brought out a large number of soft spots, shown by the black areas. The rectangular inset in the lower part of the illustration is a segregation of a particle of manganese in a piece of steel. Magnification was about 1550 *diameters and in the photograph the segregation looks like a large island. Actually it was a speck invisible to the naked eye, being only* 0.0015-*inch long and* 0.00025-*inch across.*

Flowers, Shrubs and Lawn Grow at By-Product Coke Plant



IN IRON TRADE REVIEW, *Feb, 11 appeared several photographs of flowerbeds and hedges at a steel foundry in Birdsboro, Pa. They evidently attracted considerable attention, as some manufacturing companies give serious thought to the beautification of their yards and walls. The accompanying photographs are from the Alabama By-Products Corp., Tarrant City, a suburb of Birmingham. The practicability of raising grass, flowers and shrubs near a coke oven by-product plant might be doubted; but it has been accomplished, and adds greatly to appearance and the impressions employes, employers and the public receive.*



Stack Smelts Foreign Iron Ores

Eastern Producer of Merchant Pig Iron Completes Program of Modernization —Location Permits Shipment by Water—Bell Rigs Are Electrically Operated

By E. C. Kreutzberg

Location Important

CHANGING economic factors affecting the merchant pig iron industry in the East were discussed in an article published in IRON TRADE REVIEW, *Jan. 7, 1926. This article told about new conditions which merchant furnace interests now face. Built adjacent to by-product coke ovens and located on the water side, the merchant furnace is spared the expense of high freight rates on coke, iron ore and, to some extent, on pig iron. It is believed these advantages are sufficient to enable present day merchant furnaces to survive the competition of the steelworks furnaces on the one hand and that of foreign iron on the other. A description of the plant of the Delaware River Steel Co. at Chester, Pa., the first merchant furnace to meet the situation, is presented in the accompanying article.*

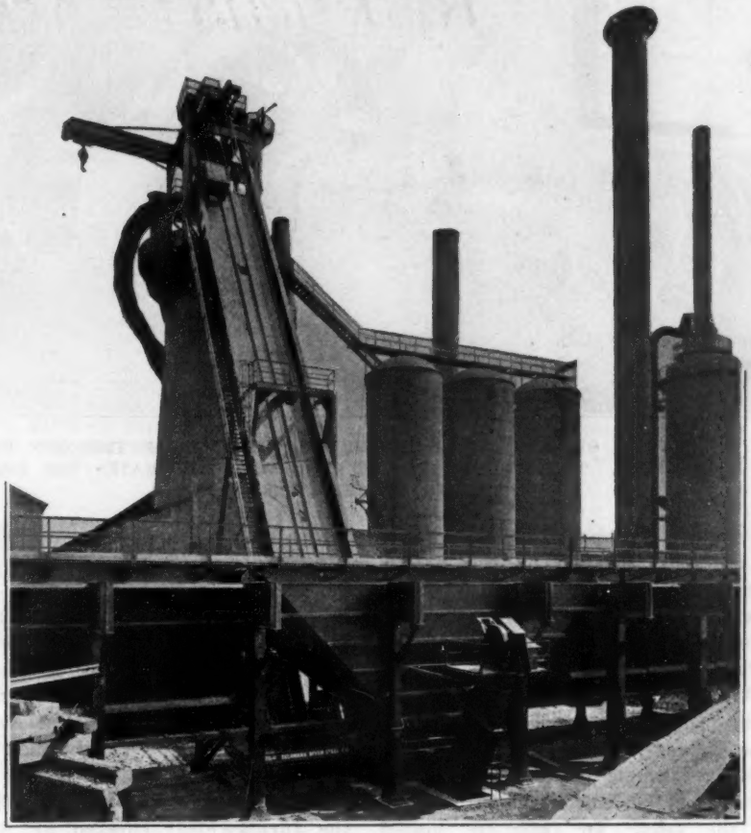


FIG. 1—STACK OF THE DELAWARE RIVER STEEL CO., CHESTER, PA., SHOWING THE TRESTLE STRUCTURE, STORAGE BIN SYSTEM AND SKIP BRIDGE

WHEN the blast furnace of the Delaware River Steel Co., Chester, Pa., was placed in operation last summer, the event attracted wide attention. It marked the inauguration of production at a merchant furnace located at tidewater and receiving foreign ores direct.

To properly understand the development at Chester, the following background is presented. After the war, many Eastern merchant pig iron producers found themselves with a baffling problem on their hands. The large wartime demand for pig iron had ceased and government-fixed prices had disappeared. The price then and most of the time since has been at levels at which only the lowest cost makers could compete. Steel companies with by-product coke oven plants and large reserves of low-cost iron ore have been active competitors in the Eastern pig iron market since the war. The imports of iron from Europe and India have been heavy. Most of the merchant producers, despite the fact that their furnaces in many cases are of the most modern and efficient type, have found themselves unable to meet this competition in the East and as a result their furnaces have been idle much of the time since the war.

Stack Located Advantageously

Among the Eastern merchant operators who found themselves in this dilemma was the Delaware River Steel Co. Its furnace at Chester for many years had been a prominent factor in the Eastern merchant pig iron industry. In surveying the changed conditions existing after the war, the Chester furnace found itself possessed of one advantage not enjoyed by any of the other Eastern merchant stacks. That was its location on the Delaware river, at a point which was being passed by ocean-going steamships at all hours of the day. The company then was using foreign iron ore, unloading the ships at Philadelphia and paying freight on the ore from Philadelphia to Chester. Confronted with the necessity of paring its production costs, it decided to take full advantage of its waterside location. Accordingly, it undertook in 1923 a program of improvements that was completed in August 1925. Observation of results of operation since that time indicates that the furnace will continue definitely a factor in the Eastern merchant pig iron market.

Most important of the improvements at Chester was the construction of a deep-water dock. This was built by J. E. Brennamant Co., Philadelphia, and is employed primarily for unloading iron ore from ocean carriers which are spotted immediately alongside. It also is used for loading pig iron into barges for shipment to consuming plants located on the water. The pier is 430 feet long and is built on piles. The face of the pier and the two sides are of concrete. A timber deck was built on the piles and above this deck the dock has been filled in with dirt. The slip alongside has been dredged to a depth of 27 feet at low water.

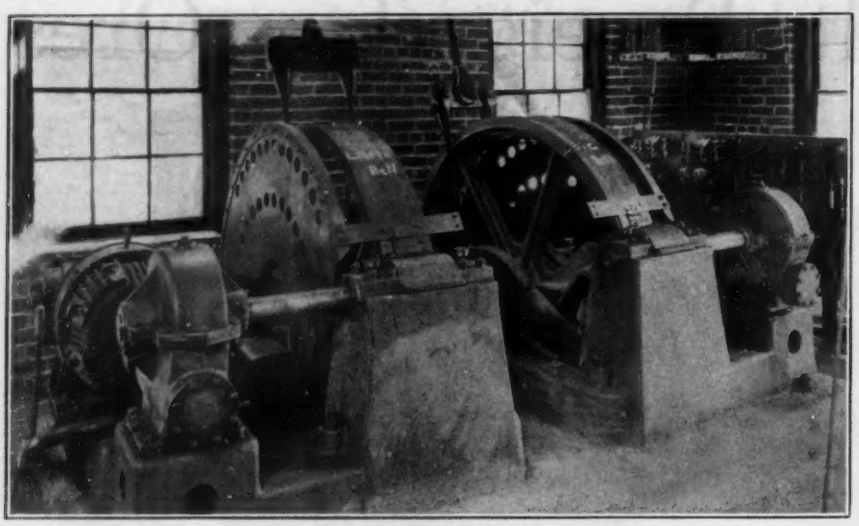


FIG. 2—INTERIOR OF SKIP ENGINE HOUSE LOCATED BENEATH THE SKIP BRIDGE STRUCTURE. THE MACHINE IN THE FOREGROUND OPERATES THE BIG AND LITTLE BELLS

The pier is equipped with an unloading machine installed by the Brown Hoisting Machinery Co., Cleveland. This is mounted on tracks 68 feet center to center and spans four tracks for loading the ore into railroad cars for transfer to the furnace.

The ore storage at the furnace has capacity for 100,000 tons. This is considered ample because ore can be unloaded at Chester at any time during the year. In fact, ore loaded into the ships in warm climates, such as in the Mediterranean, still is warm on arriving at Chester in cold weather, so that it may be unloaded with the same facility as in the summer. Other ores, such as the Swedish, are free of moisture and, hence, can be handled in any sort of weather.

In 1922 the Delaware River Steel Co. increased the height of its stack from 70 to 85 feet. At the same time it added a fourth stove and installed a single-strand pig casting machine. In its modernization program of 1924 and 1925, it converted its furnace into a modern skip-filled unit, thus doing away with the old hand-filling methods. The modernization of the furnace was effected by Arthur G. McKee & Co., engineers and contractors, Cleveland, who installed a new stock trestle and storage bin system, scale car, skip bridge and hoisting engine, a new furnace top structure with a McKee-type revolving distributor, and electrically-operated bell rigs of the Morrison type. As a result of these improvements the capacity of the furnace now is rated at 10,000 tons per month.

A complete new trestle, which is of steel construction, consisting of 38 bents and having a total length of approximately 720 feet, was built. Of this total, 185 feet are utilized by the ore, coke and stone bins, the remainder of the trestle being available for storage purposes. A single track trestle was installed but the columns and girders adjacent to the stock bins are extended sufficiently so this portion of the trestle can be double-tracked if desired at some later time. Walkways and handrailing were installed along each side of the trestle for its entire length.

Occupying three bents in the trestle immediately opposite the furnace is a coke bin of approximately 70 tons capacity. This discharges directly into skip cars over cascade coke screens of the McKee type. The coke bin is ⅝-inch steel plate, properly reinforced and stiffened, and ⅜-inch wearing plates are provided in the lower portions. The coke breeze, which is removed by the screens, passes into a hopper and is discharged into the yard by a bucket elevator.

Iron ore and limestone are stored in ten bins, arranged so that five are on either side of the coke bin. Each bin has capacity of 160 tons of ore and is constructed of ⅜-inch plate throughout. They are of the latest improved design of the Baker suspension type. This new design eliminates the use of inside diaphragm

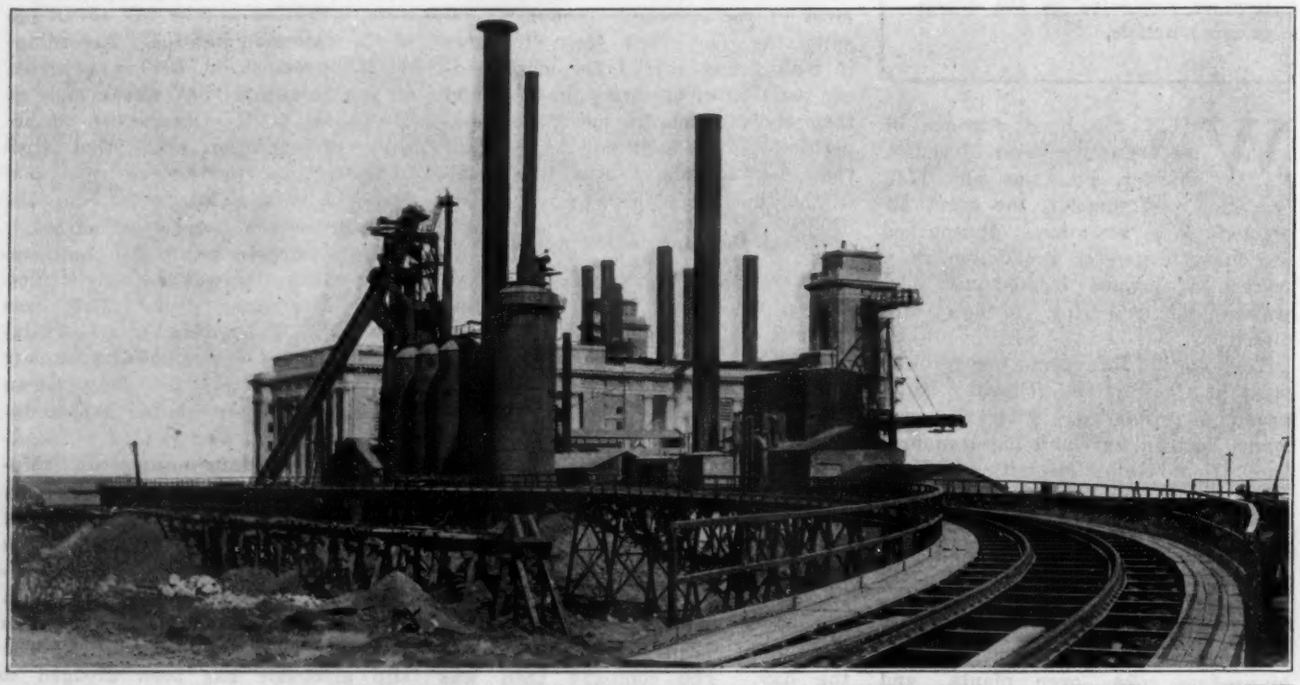


FIG. 3—GENERAL VIEW OF THE MERCHANT BLAST FURNACE OF THE DELAWARE RIVER STEEL CO., CHESTER, PA., WHICH RECENTLY WAS IMPROVED. IT NOW HAS A MONTHLY PRODUCTION OF 10,000 TONS

plates which previously tended to retard the free flow of ore from the bin. Louvres also are provided to allow the scale car operator to poke the material in the event that an extremely wet or sticky ore is being used. This improved design of bin insures ready discharge of the bin contents without any manual effort other than that of the scale car operator. The ore and stone bins are equipped with a continuous line of gates of the segmental type arranged for convenient operation from the scale car platform. The scale car has capacity of 80 cubic feet. It is of heavy construction and is equipped with a 25-horsepower motor, standard scales with beam box of the Miller type, a warning signal and the usual accessories.

The skip pit is of reinforced concrete, lined with a ⅜-inch tank to make it waterproof. A double track skip bridge was installed, the bridge being of the deck type with shear leg support midway between the base and the top of the bridge. Two skip cars equipped with manganese steel wheels were provided for carrying the stock up the bridge into the furnace.

The new furnace top equipment consists of a ¾-inch plate gas seal with cast top and bottom flanges, a McKee revolving distributor, a 20-ton trolley for handling the large bell and hopper, bell beams, bleeder, test rod mechanism, etc., when it is necessary to dismantle the top rigging. The revolving distributor is of the latest improved design with worm and gear drive direct from the distributor motor, which is mounted on the spider supporting casting. The distributor control board is located in the hoist engine house, as are also the electrically-operated bell rigs.

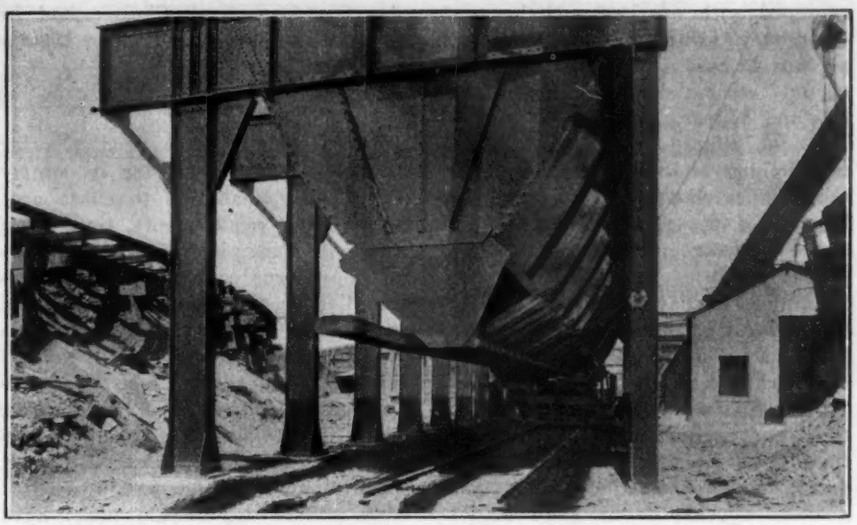


FIG. 5—VIEW OF THE SUSPENDED TYPE STORAGE BINS SHOWING THE SCALE CAR IN THE DISTANCE. TEN BINS ARE PROVIDED FOR LIMESTONE AND IRON ORE STORAGE

Owing to the necessity of conserving the available supply of steam, it was decided to install electric bell hoists of the Morrison type.

This type of hoist requires little power and from its operation appears to have many advantages over the steam, air and oil-operated bell rigs heretofore used. Both large and small bell hoists are identical with the exception that the worm and gear unit for the small bell hoist has a larger reduction than that for the large bell. The operating cable is attached through a spring barrel trunnion to the end of the levers mounted on the large gear shaft. This spring is compressed when the bell is closed; in operating the compression is relieved and the bell starts to open slowly, gradually increasing in speed until about half way open, when its speed decreases until the lowest open position is reached. The bell is closed with the same relative speed motion, a complete cycle of dumping and raising being accomplished without reversing the motor. The rigs are

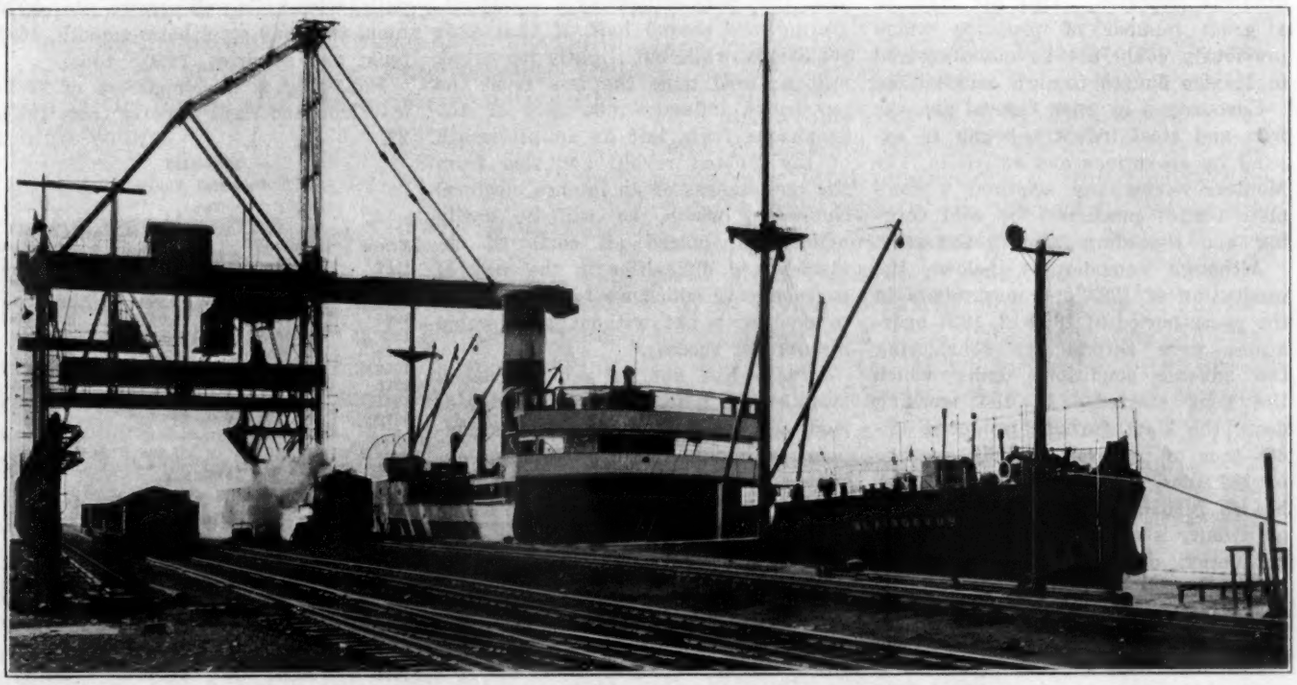


FIG. 4—NEW PIER SHOWING THE UNLOADING OF FOREIGN IRON ORE. THE UNLOADING MACHINE SPANS FOUR RAILROAD TRACKS. THE SLIP HAS BEEN DREDGED TO A DEPTH OF 27 FEET AT LOW WATER

equipped with overload switches and emergency switch to stop the apparatus in case a large piece of scrap should become lodged between the bell and hopper.

It is believed by the officials of the Delaware River Steel Co. that these improvement were justified only because of the location of the plant on salt water. Even with the improved facilities it would have been impossible to have operated in competition with foreign iron and domestic irons which are pressed upon the market in dull times. It is pointed out that the total importations to this country during 1925 were more than double those of the preceding year, and that this source of competition appears to be more or less permanent. Of the 441,000 tons of pig iron imported into this country in 1925, 47 per cent came up the Delaware river to Philadelphia, so that the furnace at Chester had in competition more than twice its annual capacity.

Has World Ore Supply

As to the materials used, Chester draws upon the world for its supply of ore and is able to purchase ores to meet any requirements, thus being able to produce pig iron from the lowest phosphorus content such as is required in special irons, to the highest phosphorus demanded. These ores are imported from Sweden, Spain and North Africa, chiefly, and are available at all times and in varying quantities to meet the requirements. Some of the ores are self-fluxing, soft in quality and easily smelted while others are of the usual hard type but of excellent chemical quality. This ability to select ores from the world's supply, thereby permitting economical mixtures, is one of the benefits of the location on the Delaware river. The consumption of ore is at the rate of approximately 200,000 to 250,000 tons a year. The ore is all unloaded at the new dock which is now in successful operation and yielding the estimated savings.

The coke is manufactured in the new Roberts-Morissey type ovens of the Philadelphia Suburban Gas & Electric Co. which are located within the same enclosure as the furnace, no railroad transfer being required excepting the usual switching within the yard. Due to the location, coal can be obtained from the high and low-volatile districts of Pennsylvania in the proportions desired or it is possible to bring the lower ash and higher volatile coals from the Virginias and discharge them at the company's dock, thereby obtaining two sources of coal, either of which is adequate and entirely satisfactory.

Mexican Steel Industry Is Recuperating

FOLLOWING closer settlement of political disturbances in Mexico and a firmer attempt to stabilize industrial conditions, the iron and steel situation there has taken on a more encouraging outlook, according to the recently issued 1924 annual report of the Monterrey Iron & Steel Co., Ltd., Mexico, D. F. Early in 1924 the president of Mexico issued a decree of protection for Mexican industries. The new customs rates specified with a more methodical classification the products imported. This list included a great number of products which previously could not be manufactured in Mexico due to foreign competition.

Encouraged by such federal aid, the iron and steel industry began to expand its operations and activities. The Monterrey company acquired a complete set of machines for cold forging and threading from Germany.

Although considerably below the production of 1923 and most years in the peace period of 1903-12, 1924 operations were satisfactory considering the adverse conditions under which the year started. In 104 working days, the blast furnace produced 19,485 tons of pig iron, a daily average of 187 tons. In 295 days, the open-hearth furnaces produced 37,612 tons, or a daily average of 127.5 tons. Its production of finished steel totaling 31,637 tons was divided as follows: Structural iron, 9840 tons; commercial iron bars, 12,341 tons; rails and fish plates, 8901 tons and billets, 555 tons.

The Monterrey company mined 7385 tons of iron ore from its Golondrinas group and 45,603 tons from its Durango group. Of the total 6239 tons was sold and 45,890 tons used in the company's plants.

Explaining in its report the conditions under which industry operated in Mexico during 1924, the company states: "We all feel keenly and deplore the disastrous general conditions under which work has had to be carried along during the first half of 1924, when we have had to struggle under the harrowing anxieties of war and the perplexities of revolution. During the second half of that year conditions, while but slightly improved, still suffered none the less from the pernicious influence not only of the suspicious fears left as an aftermath of the quieted revolt, but also from the restlessness of an intense electoral campaign, which, as will be easily understood, placed all sorts of obstacles and difficulties in the way of our company which we have been able to deal with not without a tolerable measure of success."

Mexico has not as yet reached a stage where it is a major importer of iron and steel from a world standpoint, although it is a convenient consumer of some of the American surplus production. From 1903-12, called peaceful years in the company's report, imports into Mexico of iron and steel, totaled 2,277,076 tons. In the period from 1913-22, or revolutionary years, the receipts amounted to but 731,399 tons. Analysis of imports for 1924 reveal that activities of American oil interests in Mexico are responsible for much of the tonnage imported. Of 105,338 tons total in the analysis, 28,165 tons was for steel piping of more than 15 centimeters inside diameter and 19,002 tons for pipe less than 15 centimeters inside diameter. The only other products to be imported in large quantities during 1924 were iron and steel bars in non specified forms, 12,094 tons; rails, switches, ties and frogs, 6595 tons; fence wire, 6448 tons; wire from 1 to 10 millimeters diameter, 4309 tons; nails, wire nails and screws, etc., 3076 tons; iron and steel bars, smooth, 4685 tons; and sundries, 12,918 tons.

Following is a comparison of Mexican iron and steel imports from 1903-22.

1903-1912
Peaceful Years
Tons

Years	Imported	Domestic production	Total consumption
1903	168,920	9,932	178,852
1904	139,392	23,430	162,822
1905	184,149	19,684	203,833
1906	210,726	31,062	241,788
1907	230,402	23,082	253,484
1908	184,996	23,555	208,551
1909	261,415	48,656	310,071
1910	208,242	54,698	262,940
1911	161,521	63,965	225,486
1912	171,417	57,832	229,249
Totals	1,921,180	355,896	2,277,076

1913-1922
Revolutionary Years
Tons

1913	5,000	12,758	17,758
1914	.....	.....	.....
1915	14,586	1,714	16,300
1916	33,109	19,981	53,090
1917	34,928	19,119	54,047
1918	31,305	25,891	57,196
1919	99,619	30,904	130,523
1920	105,869	26,034	131,903
1921	99,217	34,110	133,327
1922	95,681	41,574	137,255
Totals	519,314	212,085	731,399

Editorials

Measures of Trade Are Healthy

CONTINUED general prosperity in this country over the coming year will hinge, it is widely believed, upon what happens in a few important key industries, including building, automobiles, and railroad equipment. The year is yet young but records which are so far available tell an encouraging story. The picture, of course, will not be rounded out in definite shape for some months to come. Meanwhile all of the lines from which most was expected are giving a good account of themselves.

Underlying this fact is the basic soundness of conditions and the breadth of the nation's purchasing power. Employment remains large and wages are at high levels. Productive capacities are exceptional, but as yet outputs have not exceeded the country's great power of consumption.

The F. W. Dodge Corp. reports that new construction work started during the first two months of 1926 exceeded that for the same period of 1925 by fully 37 per cent. Contemplated awards for building in February were 27 per cent ahead of one year before. Automobile production during January and February was 30 per cent ahead of those two months in 1925. The railroads in the first two months bought about 22,000 cars compared with 6000 in the corresponding period of 1925. All in all it would appear that business is not as sluggish or unsatisfactory as some seem to have let themselves believe and that important measures of activities are encouraging. The truth is the business of the country continues at a high volume.

Adapt Product To New Needs

IN CO-OPERATION with the American Petroleum institute, large producers of tubular products are beginning to make seamless casing of larger outside diameter size to permit running a string to depths greater than heretofore. Stock of 54 pounds and 13 inches outside diameter previously was used in combination with 10-inch casing for a maximum depth of 1214 feet. This size has a factor of safety of 2 against collapse. Recently seamless tube producers have adopted a 13⅜-inch outside diameter casing which can be used satisfactorily with the present 15½-inch and 10-inch, 60 to 80-pound combination. This size casing has a factor of safety of 2 against collapse, and can be set 1724 feet deep, according to recent installations in several deep drillings.

In this and other ways pipe producers are getting ready to participate more extensively in large tonnage sales of seamless casing, drill pipe and other oil country goods this year and next. More deep wells are planned for the West, particularly in California, and the intention is to go back over some of the worked-out fields in the Southwest and West and drill the abandoned wells into deeper sands. For these projects seamless tubing will be utilized because of its great resistance to collapse, its ability to withstand side pressure. Moreover its resistance to the crushing action of the coupling and to the wearing and cutting action of the sucker rods is gaining wide recognition.

Production Heading for a Record

SOME industrial observers believe steel production in 1926 may establish a new world's record and, although but two months of the year have passed, performance thus far supports such a forecast. During the 50 working days of January and February, 7,948,684 gross tons of steel ingots was made, representing a rate for the two-month period of 158,974 tons per day.

For the corresponding period during 1925, embracing 51 working days, production amounted to 7,954,807 tons and indicated an average of 155,977 tons per day. The 1925 two-month rate was the highest in history up to that time, but 1926 output has eclipsed it by 2997 tons per day. Some statements published elsewhere have compared only total productions during the two periods, giving rise to the inaccurate impression that operations of the present year are on a lower plane than those of a year ago.

With a rate of 159,752 tons per days, January ingotmaking was the largest for any January on record and the third largest month for all time. Against the 155,502 tons daily of one year ago, it showed a gain of 4250 tons. The February rate of 158,131 tons per day, likewise, was the highest February in history and the fifth highest month for all time. It was better than the February 1925 rate by 1621 tons per day. The country's record steel output was in March, 1924, with 161,796 tons per day. Thus the January 1926 output represented 98.8 per cent and the February, 98 per cent.

Average daily ingot production for all of 1925,

the banner year, was 142,080 tons, against which the 158,974-ton average of the first two months of 1926 represents a gain of 16,894 tons per day, or 11.9 per cent. Operations of the steelworks during the first part of March have been expanded and there is a good basis for believing a new record production rate for all time is in the making.

Trade Recession Not in Sight

WITH production indices at high levels, some concern naturally manifests itself as to the possibility of a tendency toward overproduction in industry in the next few months. Certain observers profess to see a trend in that direction, while others well qualified to pass judgment on national conditions are reassuring in their views that any danger of overproduction for some months seems remote.

Fortunately, no accumulation in stocks exists. This is due in no small measure to the efficiency of rail transportation, which is helping to accomplish early and quick deliveries of products, contributing essentially to rapid turnover of goods, more rapid in fact than in any preceding period in American industrial history.

Secretary Hoover, who keeps a weather eye on business and industrial trends, frequently has expressed satisfaction over the fact that for the last year or more no speculation in commodities has developed. Pyramiding of prices, with consequent inflation, thus is avoided. One of the supreme needs is for business and industry to keep a level head. Every tendency toward commodity speculation and price pyramiding toward the inflation peak should be checked. With production held within bounds, even though at a high level, no recession in demand for products seems likely, at least in the immediate future.

Industry Curing Its Own Ills

AT THE recent conference of producers and users of foundry castings in Washington Secretary Hoover pointed out that industry is demonstrating to a remarkable degree how it can cure its own ills, without agitation for congressional meddling, through simplifying products and standards and elimination of waste.

The lumber industry is cited as one that by the adoption of standards has disposed of most of the harassing situations resulting from desires to remedy real and supposed ills in the industry through action in congress.

To date some 900 conferences have been held in Washington by business and industrial interests of the country since Secretary Hoover created the division of simplified practice in the department of commerce. How much waste has been eliminated is hard to measure. That the programs have paid dividends in a better feeling toward business is evident by the decreased impetus of many forces to have congress investigate and legislate for this or hat industry. In addition to the machinery set up by the government for the aiding of business to eliminate costly practices, business itself is called upon to give more of service, even though the immediate reward does not appear in sight. The department of commerce stands ready to co-operate in any reasonable plans of industry to eliminate waste.

What Our Readers Are Thinking

"What Canadian Industry Needs"

TWO things are necessary for the development of a prosperous iron and steel industry in Canada, extension to provide for the manufacture of products not at present made in the country and reasonable protection from unfair foreign competition. The latter would lend encouragement for the former.

It is most lamentable that our national leaders and legislators cannot, or will not, see the great advantages foreign plants have over Canadian in the production of iron and steel, and take these into account by putting Canadians on a closer level with their competitors by the use of the customs tariff.

Mass production, in many cases, for large and well protected home markets and for export with consequently lower costs, cheap labor, low freight rates, depreciated currencies, and even export bounties paid by foreign governments, are among the forces which sweep over Canada's tariff fence, already low and further weakened by the many special rates of duty and exemptions provided for.

Were the leaders of the people and guides of national policy in the United States of America faced with the conditions confronting our nation today, plans for remedial action would be in the making within 24 hours. Their tariff policy, which shuts out any products we might have for export, proves the statement.

We have no desire to ape the United States, but we do feel it is entirely unfair to ask Canadian manufacturers to face and compete with the large United States plants, taking into consideration industrial and tariff conditions as they exist in the two countries. Even old England, free trade diehard that she is, is resorting to protection for certain of her industries, and when she provides protection she makes it real and effective for a specified minimum period of time—no monkeying with the schedules every few months is tolerated there.

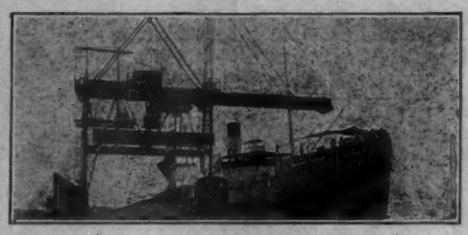
The very least our political leaders can do for Canadian industry today is to stop the unscientific tinkering with the tariff which has been going on all too long, and establish an impartial board or commission to investigate Canadian agricultural and industrial conditions and put into effect such measures as are necessary for placing them on a sound footing and giving them an opportunity for growth and development.—W. C. FRANZ, *President, Algoma Steel Corp.*

The Readers' Page

Vol. LXXVIII, No. 11 IRON TRADE REVIEW March 18, 1926

Manufacture of Home Range Boilers Described

ONCE a luxury, now a necessity, the home range boiler, or tank, represents a large outlet for steel during the course of a year. Even the least expensive of dwelling houses today is not modern unless it is equipped with a boiler for heating a continuous water supply; one instance of where steel promotes and serves civilization. The manufacture of the boilers is an interesting process, as described on page 693. In 1924 there were 130 types and sizes, but the number has been reduced to 13, in accordance with a simplification program adopted by the makers. A boiler consists essentially of a top and bottom and cylinder, and the steel is trimmed, stamped, and punched for riveting, in heavy presses. The boilers are then riveted, cleaned by immersion in acid and hot dip galvanized. The article especially describes the method used in galvanizing.



Using Foreign Iron Ores
Page 703

Contents

SPECIAL ARTICLES

Galvanizing Important Operation in Range Boilers 693
Produces Ductile Welds by New Arc Process 696
Theory and Practice of Rolling Steel—Chap. IV Continued ..... *By Wilhelm Tafel* 697
Plan Standardization of Pipe 700
Studies Steel Structures at Record Magnifications 701
Flowers and Lawn at Coke Plant 702
Stack Smelts Foreign Iron Ores ..... *By E. C. Kreutzberg* 703
Mexican Steel Industry Recuperating 706
Editorials 707

GENERAL NEWS

Western Rate Cut Denied 732
America Losing Pacific Coast Trade 733
Foreign Pig Iron Costs Lowest 734
Industrial Man in the Day's News—*James E. Jones* 737

Here and There in Industry 736
Men of Industry 738
Obituary 739
Business Changes 744
Construction and Enterprise 741
New Trade Pubs. 746
Iron and Steel Production 748

MARKET REPORTS

Review of Markets ..... *By C. J. Stark* 714
Iron and Steel Prices 715, 716, 720, 742, 750

Pig Iron 717
Coke 718
Ferroalloys 718
Semifinished 719
Plates 719
Iron and Steel Scrap 721
Sheets 721
Tin Plate 722
Pipe 722
Bars 723
Nuts, Bolts, Rivets .. 723
Cold-Finished Steel .. 723
Structural Shapes 724
Reinforcing Bars 725
Railroad Equipment.. 726
Wire and Nails 726
Nonferrous Metals .. 727
Coke By-Products 727
Pacific Coast Markets 728
Foreign Markets 729
Machinery Markets .. 730
Crane Inquiry and Awards 730
Iron Ore 731
Warehouse 742

BUSINESS TREND

Many Activities Exceed Last Year's ..... *By John W. Hill* 710

Weekly Freight Traffic 710
Steel Bookings 711
Steel Ingots 711
Steel Prices 712
Railroad Earnings .. 712
Foundry Pig Iron 713
Steel Price Parity 713

IRON TRADE REVIEW is published every Thursday by the Penton Publishing Co., Cleveland, O. Member, Audit Bureau of Circulation; Associated Business Papers, Inc.; and National Publishers Association.

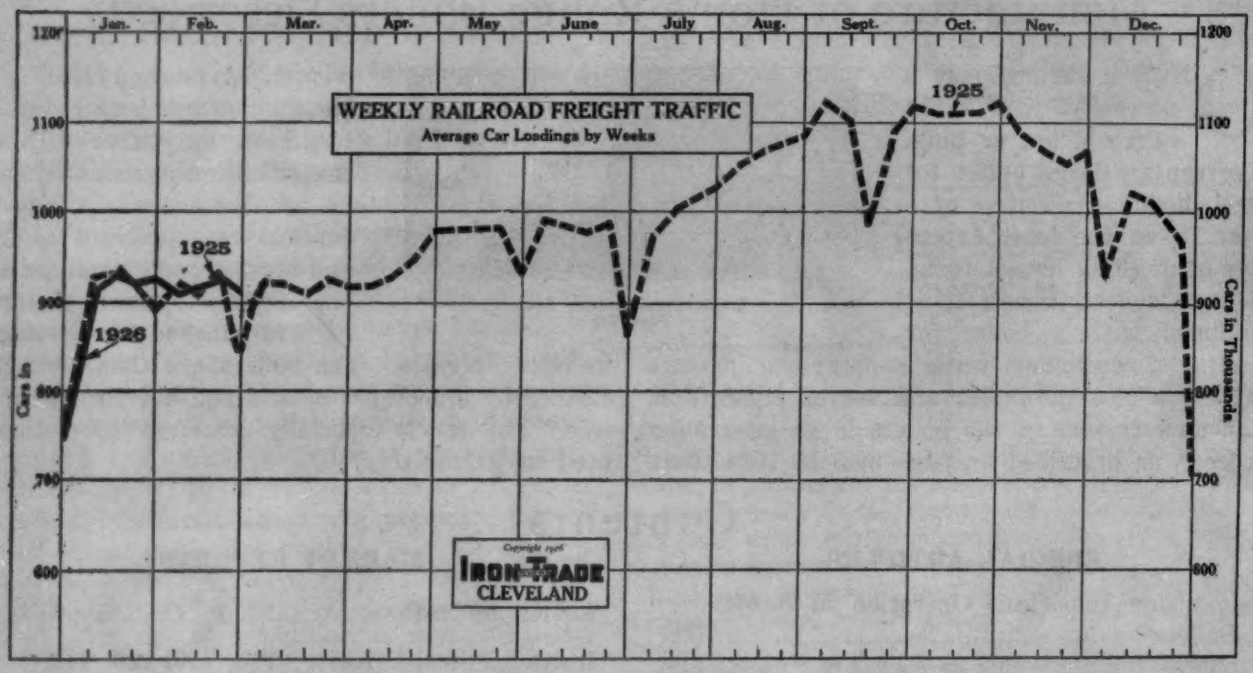
Charles J. Stark ..... Editor
Earl L. Shaner ..... Managing Editor
John D. Pease ..... Advertising Director
Francis F. Light ..... Circulation Manager

Branch offices: 1037 Old South Bldg., Boston; 1147 People's Gas Bldg., Chicago; 408 Edwards Bldg., Cincinnati; 2203-2206 No. 220 Broadway, New York; 2148-49 Oliver Bldg., Pittsburgh; 24 California street, San Francisco; 401 Westory Bldg., Washington. Foreign offices: Prince's Chambers, Birmingham, Eng.; 2-3 Caxton House, Westminster S. W. 1, London; 23 Rue de la Bienfaisance, Paris, France; 213 Freidrichstrasse, S. W. 48, Berlin, Germany.

Cable address: *PENTON*, Cleveland; *IROTRAPEN*, London.

Terms: Subscription in United States, Cuba and Mexico, $6 per year; in Canada, $8.50 per year and in Great Britain and other countries, £2:0:0 per year. *Entered at the Postoffice at Cleveland as Second Class Matter.* *Copyright 1926 by the Penton Publishing Co.*

The Business Trend



Many Activities Exceed Last Year

By JOHN W. HILL, Financial Editor

BUSINESS records over the first two months of the year paint anything but a dull picture. In fact, allowing for seasonal relaxation, they show a high level of activity. In a good many lines the records are well above those for the corresponding period of 1925 when business was counted as active.

AMONG the exhibits showing up better than they did one year ago are reports of building construction, automobile production, steel ingot output, mail order and retail sales, and railroad traffic. These are all fundamental lines of activity and give indisputable evidence of the impetus under which trade is moving as the year progresses.

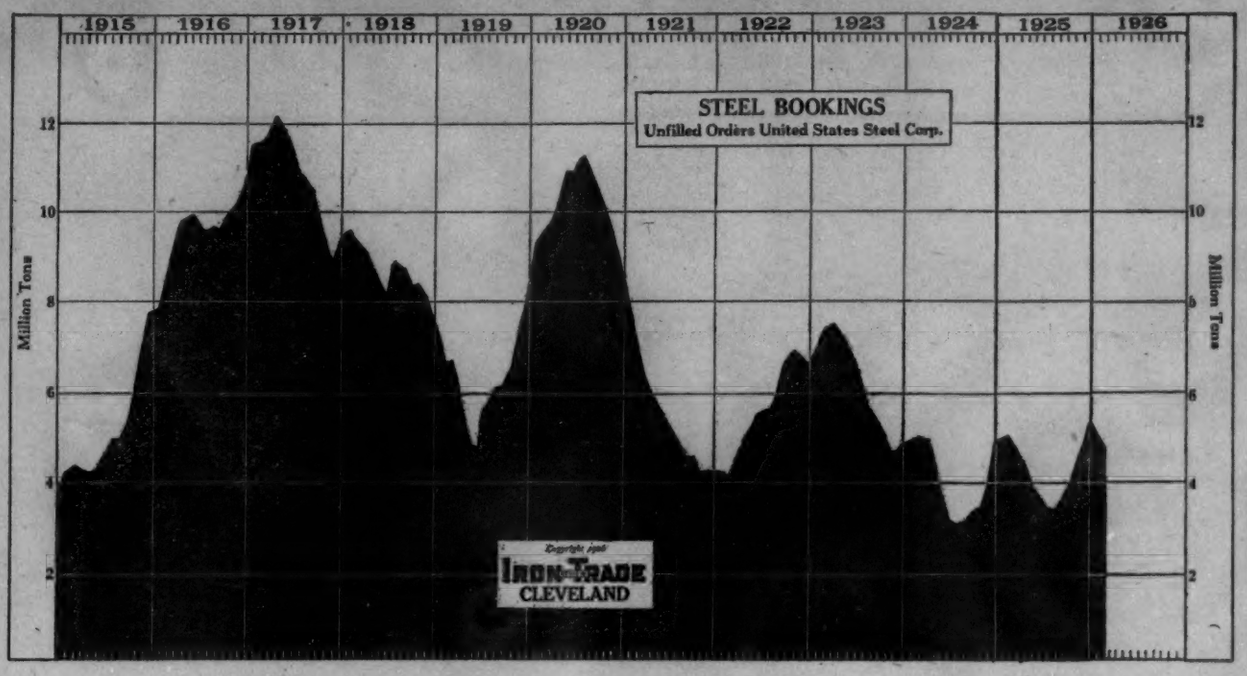
ONE of the best measures of distribution and consumption of goods is found in car loadings. During January and February loadings of revenue freight totaled 8,108,459 cars. This was an increase of 28,463 cars over the same period for 1925, and one of 182,370 cars over the corresponding period of 1924. A rapid movement of merchandise reflects good general activities.

BUILDING figures are being observed with exceptional interest this year. So far no evidence of the long-predicted recession in construction has appeared. According to the F. W. Dodge Corp. building and engineering work started during the past two months has exceeded that for the corresponding months of 1925 by 37 per cent.

NOR is this all. The planning of new work continues on a large scale. Contemplated construction jobs reported to the F. W. Dodge Corp. totaled $861,141,000 at the close of February. This was a gain of 1 per cent over January and of 25 per cent over the amount reported in February last year.

MUCH of the gain in building has been due to increased projects in and around New York and in Florida. Recently reports from Florida have indicated a flattening of the real estate boom there. This may affect building activities. Meanwhile, the approach of spring is causing some quickening of building and other lines in many parts of the country.

The Business Trend

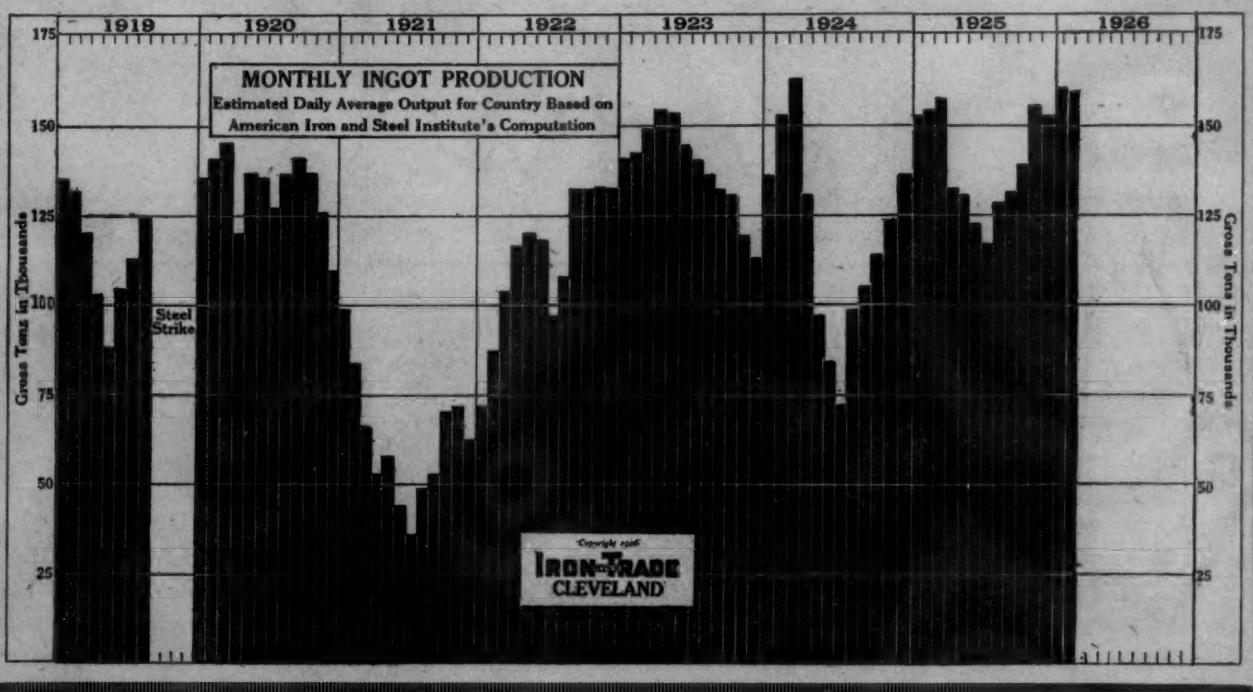


Steel Ingots

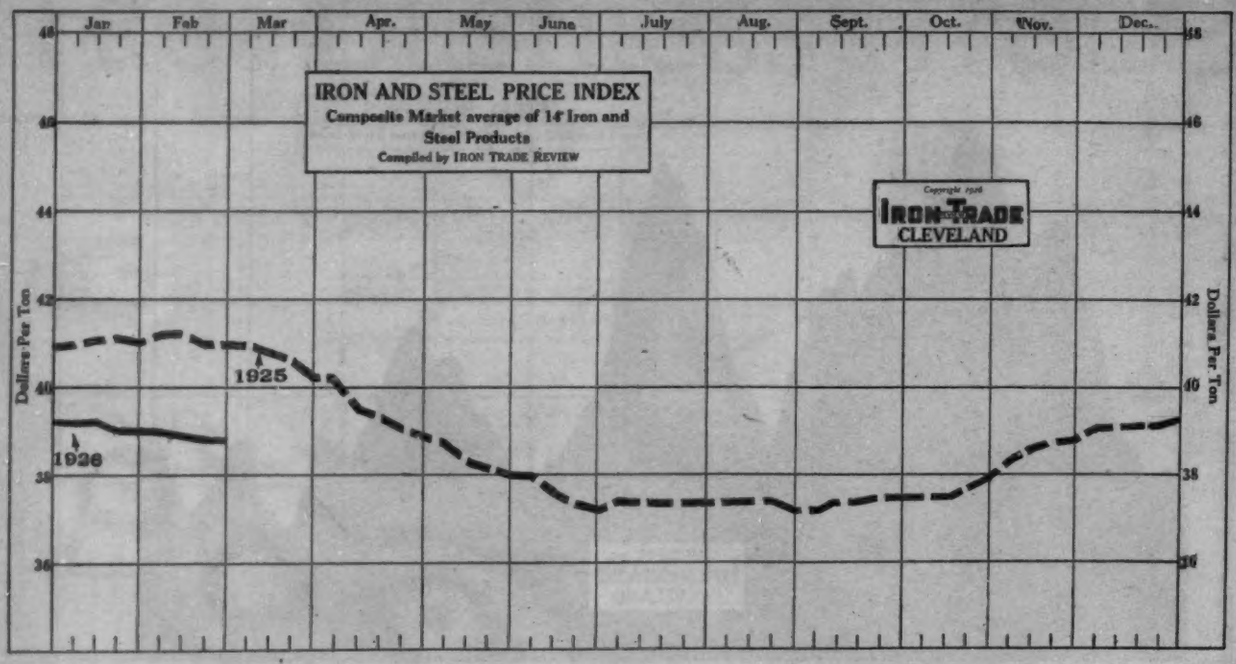
UNFILLED orders of the United States Steel Corp. made their second consecutive decline in February. The drop was 265,000 tons. This compared with a decline of 150,000 tons in January. The total volume of orders on the books of the corporation at the close of February was 4,616,000 tons. That total was 668,000 tons less than it was Feb. 28, 1925. Caution on the part of steel buyers is reflected by the drop of orders though buying has shown some increase since the beginning of March. The gain should grow more pronounced as spring approaches.

Steel Orders

THE production of steel ingots in February reached a daily average of 158,131 tons. This was the highest February rate in history. For January and February, the daily average rate was 158,971 tons against 155,977 tons in 1925, a gain of almost 2 per cent over the rate for the same period last year. The output of ingots in February was at the annual rate of 49,180,000 tons which represented 98 per cent of the highest mark for any single month on record. Although forward buying remains reluctant, demand is gaining seasonally.



The Business Trend

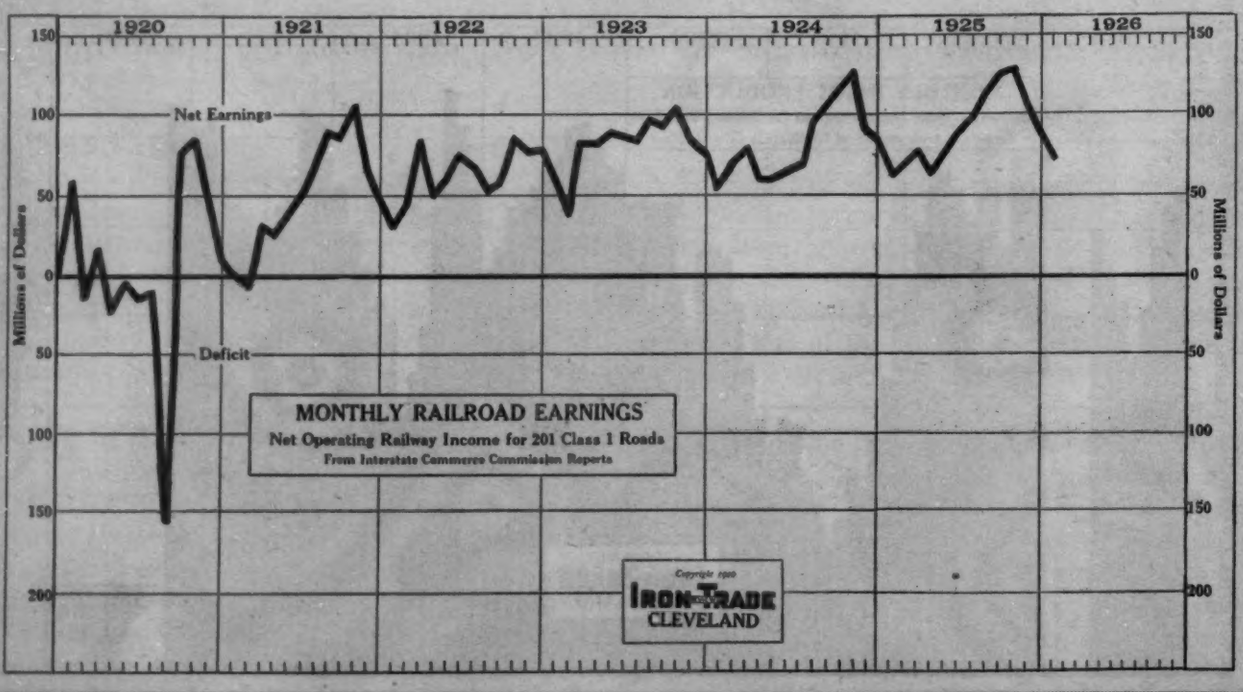


Steel Prices

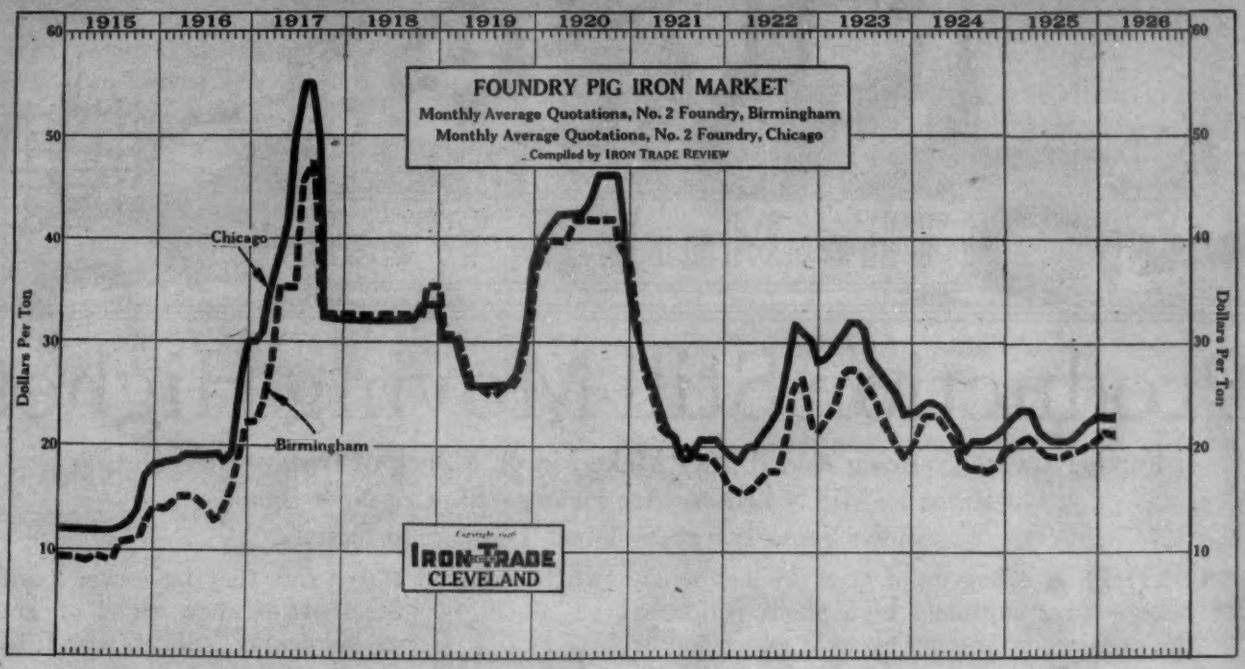
IRON and steel prices continue as a signal of increased strength in the market. IRON TRADE REVIEW'S composite market average has stood at $38.90 since the middle of February. At this level the average is 48 per cent above that for 1913. It is 4 per cent below the average of 12 months ago, although about 4 per cent higher than the low point reached last summer. Producers are strengthened in their determination to hold the market steady by the fact that demand is showing some improvement with the approach of spring.

Railroad Earnings

RAILROAD earnings in January for Class 1 roads were smaller than they were one year before. The net operating income amounted to $65,724,560 compared with $66,000,060 in January last year. This reflected the small decline in railroad traffic in the early weeks of the year compared with the corresponding weeks of one year ago. The roads in January earned on their property investment at the annual rate of 4.60 per cent. During January 35 roads out of 188 operated at a loss, according to the report for the month.



The Business Trend

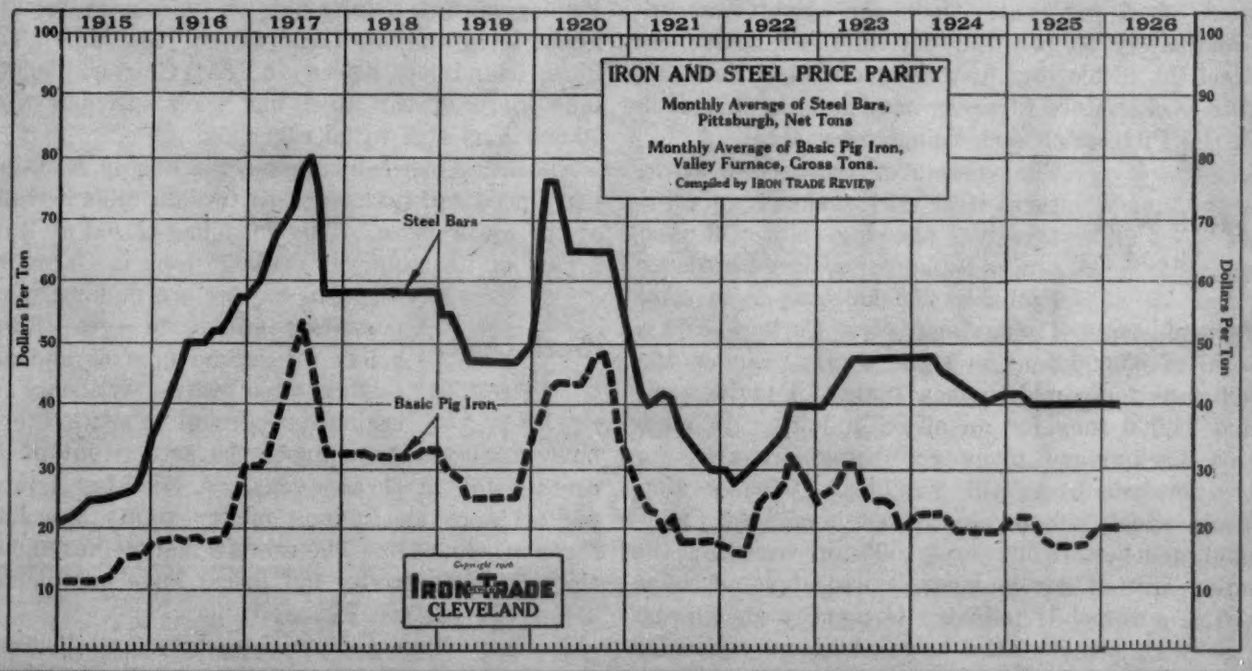

FOUNDRY PIG IRON MARKET
Monthly Average Quotations, No. 2 Foundry, Birmingham
Monthly Average Quotations, No. 2 Foundry, Chicago
Compiled by IRON TRADE REVIEW
Chicago
Birmingham
Dollars Per Ton
1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926
60 50 40 30 20 10
IRON TRADE
CLEVELAND

Foundry Iron Market

NO. 2 FOUNDRY pig iron, Chicago, has held steady in the last two months, while southern foundry No. 2, Birmingham is somewhat lower. The average quotation of northern iron in February was $23 a ton. This was unchanged from the average for January and for December. Southern iron in February showed an average quotation of $22 a ton. In January the average was $22.75 and in December it was $21.60. Thus the advance of southern iron in January was not fully lost.

Steel Price Parity

ONE of the distinguishing characteristics of the steel bar market in recent months has been its steadiness. The same applies to basic pig iron. In February the average quotation of steel bars, Pittsburgh, was $40 a ton. That price had not varied since last March when the market was quoted at $43 a ton. Basic pig iron, valley, was quoted at an average of $20, a ton in February. This price has not changed since November of last year when the average was $19.88 a ton for basic iron.


IRON AND STEEL PRICE PARITY
Monthly Average of Steel Bars, Pittsburgh, Net Tons
Monthly Average of Basic Pig Iron, Valley Furnace, Gross Tons.
Compiled by IRON TRADE REVIEW
Steel Bars
Basic Pig Iron
Dollars Per Ton
1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926
100 90 80 70 60 50 40 30 20 10
IRON TRADE
CLEVELAND

Production Still Moving Higher

Further Capacity Being Added May Make March Month of Largest Steel Output On Record—Mill Schedules Are Heavy—Flow of New Business Shows Some Increase—Good Tonnage in Sight

FURTHER speeding up of steel production, already on an unusually high plane, points to the presence of another cycle of expansion in consumption. This increase is peculiarly gaged under the prevailing conditions where buyers are drawing upon producers only as they actually need material and are not discounting future probabilities. From the way new capacity is being called into service, there is every indication that March will set a new high mark for monthly steel output for all time. The first two weeks of March find the Gary works well on the way toward the breaking of a world's record. To date output is ahead of March 1925, when the previous record was established. Leading companies in the Chicago district have their mills scheduled on the heaviest scale of any March in history.

The Steel corporation this week is running around the highest point in its history with operations of 97 per cent. One year ago, it was approximately 95 per cent active. The Bethlehem Steel Co. is blowing in three more blast furnaces this week. More furnaces have gone in this week in the Pittsburgh and Youngstown area.

Much Work Ahead

The volume of prospective structural steel work makes a very impressive showing since it embraces a number of large projects. Probably 200,000 tons is in some definite stage of planning. New York reports a total of 65,000 tons in sight which includes 12,000 tons for a mid-Hudson span at Poughkeepsie and 11,000 tons for an office building. In addition preliminary plans are being prepared for two bridges over Kill Van Kull, Greater New York, which will involve 35,000 tons. At Cleveland another 18,000 to 20,000-ton unit for the union station development is expected out soon.

The automobile industry is making good progress with some of the larger builders scheduled at the greatest March rate they have ever known.

Prices Gain Firmness

Steel prices show signs of gradual hardening. Sheets are in better demand and quotations though still irregular, reflect some improvement. This betterment is signified by the 3 per cent higher wages which sheet mill workers will receive during March and April. Plates, shapes and bars are steadier. Two eastern plate mills have advanced to 1.90c, Pittsburgh after taking considerable tonnage lower.

Two producers have reaffirmed sheet bar and billet prices for second quarter at $36 and $35 Pittsburgh or Youngstown, respectively and have booked tonnage at these figures. The market, however, has not been definitely established.

Miscellaneous car orders footing up about 2000 are reported this week. The Central of New Jersey has out an inquiry for 1000 box cars. The Pennsylvania is taking bids on its inquiry for 200 locomotives and the Lackawanna for 25. The Rock Island has placed 15. At Chicago, 50,000 tons more of car steel has been specified with 70,000 tons still to be taken out.

Another American railroad, the Boston & Maine, has placed rail tonnage with foreign mills because of the lower price. This road has closed at least a part of its inquiry for 16,000 tons in Germany.

Seek Lower Prices

Pig iron buyers are making more persistent efforts to get lower prices for second quarter and are feeling their way. Evidence of easiness is present in spots. Cleveland producers have made the second cut of 50 cents a ton in three weeks. A 3000-ton sale of malleable to an Indiana melter went to a lake furnace below $19. The eastern market has shown the principal activity but prices have not yielded below $22 eastern Pennsylvania.

Further close competition between domestic

and foreign ferromanganese has resulted in another cut of $5 per ton by American and Norwegian producers. Since the total reduction of $20 in two weeks, 10,000 tons has been sold.

The cast iron pipe market shows a wide spread of buying among municipalities for spring use. Lettings of the week total 16,000 tons with over 50,000 tons pending. San Diego is figuring on 25,000 tons and Chicago will buy 15,000 tons of small pipe. Pittsburgh mills will supply 45,000 to 50,000 tons of line pipe for Standard Oil.

IRON TRADE REVIEW composite of fourteen leading iron and steel products slipped one cent this week to $38.89, the first change in five weeks.

Prices, Present and Past

Representative Market Figures for This Week, Last Month, Three Months and One Year Ago

	Mar. 17, 1926	Feb. 1926	Dec. 1925	Mar. 1925
PIG IRON				
Bessemer, valley, del., Pittsburgh	$22.76	22.76	22.76	23.86
Basic, valley	20.00	20.00	20.00	21.35
Basic eastern del., eastern Pa.	22.50	22.50	23.00	23.75
*No. 2 foundry, del., Pittsburgh	22.26	22.26	22.26	22.86
No. 2 foundry, Chicago	23.00	23.00	23.00	24.00
*Southern, No. 2, Birmingham	22.00	22.00	21.60	21.00
*Southern Ohio, No. 2 Ironton	21.00	20.60	21.10	21.60
**No. 2X, Virginia furnace	23.00	23.25	23.30	24.00
**No. 2X, eastern del. Phila.	23.26	24.01	24.26	24.51
Malleable, valley	20.50	20.50	20.50	21.25
Malleable, Chicago	23.00	23.00	23.00	24.00
Lake Superior charcoal, Chicago	29.04	29.04	29.04	29.04
Gray forge, val., del. Pittsburgh	21.76	21.76	21.76	22.36
Ferromanganese, del., Pittsburgh	99.79	119.79	119.79	119.79
*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.				
COKE				
Connellsville, furnace, ovens	3.25	7.45	4.00	3.35
Connellsville, foundry, ovens	4.50	6.50	5.10	3.85
SEMIFINISHED MATERIAL				
Sheet bars, open-hearth, Youngstown	36.00	36.00	36.60	38.50
Sheet bars, open-hearth, Pittsburgh	36.00	36.00	36.60	38.50
Billets, open-hearth, Pittsburgh	35.00	35.00	35.20	37.75
Wire rods, Pittsburgh	45.00	45.00	45.40	48.00
FINISHED MATERIAL				
Steel bars, Pittsburgh	2.00	2.00	2.00	2.10
Steel bars, Chicago	2.10	2.10	2.10	2.20
Steel bars, Philadelphia	2.32	2.32	2.32	2.42
Iron bars, Philadelphia	2.22	2.22	2.22	2.28
Iron bars, Chicago, mill	2.00	2.00	2.00	2.10
Beams, Pittsburgh	1.90	1.90	1.95	2.10
Beams, Philadelphia	2.22	2.17	2.17	2.32
Beams, Chicago	2.10	2.10	2.10	2.30
Tank plates, Pittsburgh	1.85	1.85	1.90	2.05
Tank plates, Philadelphia	2.12	2.12	2.07	2.37
Tank plates, Chicago	2.10	2.10	2.10	2.30
Sheets, black, No. 28, Pittsburgh	3.25	3.35	3.35	3.45
Sheets, blue anl., No. 10, Pittsburgh	2.50	2.50	2.50	2.65
Sheets, galvanized, No. 28, Pittsburgh	4.60	4.60	4.60	4.70
Sheets, black, No. 28, Chicago	3.50	3.50	3.50	3.75
Sheets, blue anl. No. 10, Chicago	2.65	2.65	2.65	2.85
Sheets, galvanized, No. 28, Chicago	4.75	4.75	4.75	4.90
Wire nails, Pittsburgh	2.65	2.65	2.65	2.85
Wire nails, Chicago	2.70	2.70	2.70	3.00
Tin plate per base box, Pittsburgh	$5.50	5.50	5.50	5.50
OLD MATERIAL				
Heavy melting steel, Pittsburgh	18.00	17.60	19.00	18.25
Heavy melting steel, eastern Pa.	16.50	16.35	17.65	16.25
Heavy melting steel, Chicago	14.25	13.75	15.50	16.70
No. 1 wrought, eastern Pa.	18.00	18.00	18.75	19.50
No. 1 wrought, Chicago	14.50	14.40	15.40	16.65
Rails for rolling, Chicago	16.50	16.30	18.55	18.15

Composite Market Average

The Fourteen Leading Iron and Steel Products Included are Pig Iron, Billets, Slabs, Sheet Bars, Wire Rods, Steel Bars, Plates, Structural Shapes, Black, Galvanized and Blue Annealed Sheets, Tin Plate, Wire Nails and Black Pipe

This week (March 17, 1926)	$38.89
Last week (March 10, 1926)	38.90
One month ago (February, 1926)	38.95
Three months ago (December, 1925)	39.14
One year ago (March, 1925)	40.70
Ten years ago (March, 1916)	37.18
Thirteen years ago (March, 1913)	27.93

Late News Flashes

Will Start New Furnace

Chicago, March 16.—The new blast furnace of the Inland Steel Co. at Indiana Harbor is slated to be blown in early in April. Eventually, more open-hearth furnaces may be constructed here.

To Blow in Three Furnaces

Philadelphia, March 16.—Bethlehem Steel Co. today announced that it would blow in a blast furnace at Bethlehem on Wednesday, another at Johnstown, O. on Friday and still another at Coatesville sometime the latter part of the week.

Strip Mill Awards Are Made

Pittsburgh, March 16.—A portion of the sheet-strip mill to be installed at the Butler, Pa. plant of the Columbia Steel Co. was awarded the United Engineering & Foundry Co. today. The installation will include a 24-inch universal mill and four 24-inch flat mills arranged in tandem.

More Blast Furnaces Become Active

Pittsburgh, March 16.—Steelworks operations in the Pittsburgh area are practically unchanged from a week ago, the general average being about 85 per cent but more blast furnaces are resuming. Some steel works are on a 90 per cent basis but others only have reached 75 per cent. Shenango Furnace Co. banked its No. 1 furnace March 13 for 10 days, while the Clinton Iron & Steel Co. blew in its stack March 12. Carnegie Steel Co. is operating its Ohio steelworks 100 per cent. It has blown in its No. 6 furnace at Youngstown, giving a total of 41 furnaces active. Next week A. M. Byers Co. will blow in its Girard stack. Lighting of the Claire stack of the Reliance Coke & Furnace Co. may be deferred until sometime in April.

Gary Topping World's Record

Chicago, March 16.—Daily average production at the Gary works of the Illinois Steel Co. the first half of March ran ahead of the average for last March, when what is claimed to be a monthly output record for any steel plant in the world was made. Last March the record tonnage was 224,000 gross tons of pig iron and 329,400 gross tons of open-hearth ingots. Now it is believed these marks will be beaten.

Ingot operations for the Chicago district as a whole have expanded and approximate 90 per cent. All but six of 35 steel-works stacks and 7 of ten merchant furnaces are active. With the Thomas stack at Milwaukee down for repairs to its stoves the lineup of active merchant stacks is 7 out of ten.

Current Rolled Steel Prices

PRICES, CENTS PER POUND, UNLESS OTHERWISE STATED

Semifinished Material

Prices per gross ton

BILLETS AND BLOOMS
4 x 4-inch base

Pittsburgh, open-hearth	$35.00
Pittsburgh, bessemer	35.00
Youngstown	35.00
Philadelphia	40.30 to 41.30
Chicago	35.00
Forging, Pittsburgh	40.00 to 41.00
Forging, Philadelphia	45.30 to 46.30

SHEET BARS

Pittsburgh	36.00
Youngstown	36.00

SLABS

Pittsburgh	35.00
Youngstown	35.00

WIRE RODS
¼-inch and finer

Pittsburgh	$45.00
Cleveland	45.00
Chicago	46.00

Standard extras, $2.50 per ton over ⅜-inch; $5 for screw stock; $15 for acid wire rods. Carbon extras, $3 for 0.20 to 0.40; $5 for 0.41 to 0.55; $7.50 for 0.56 to 0.75; $10 over 0.75.

SKELP

Grooved skelp, Pittsburgh	1.85c to 1.90c
Universal skelp, Pittsburgh	1.85c to 1.90c
Sheared skelp, Pittsburgh	1.85c to 1.90c

Structural Shapes

Pittsburgh	1.90c to 2.00c
Philadelphia	2.17c to 2.32c
New York	2.19c to 2.34c
Chicago	2.10c
Cleveland	2.09c to 2.19c
Birmingham	2.05c to 2.15c

Steel Plates

Pittsburgh	1.80c to 1.90c
Philadelphia	2.12c to 2.22c
New York	2.14c to 2.24c
Chicago	2.10c
Cleveland	1.99c to 2.09c
Birmingham	1.95c to 2.05c

Iron and Steel Bars

Pittsburgh, soft steel	2.00c to 2.10c
Pittsburgh, cold finishing	2.15c to 2.25c
Pittsburgh, forging quality	2.15c to 2.25c
Philadelphia, soft steel	2.32c
New York, soft steel	2.34c
Chicago, soft steel	2.10c
Cleveland, soft steel	2.19c
Birmingham, soft steel	2.15c to 2.25c
San Francisco, soft steel	2.60c
Pittsburgh, refined iron	3.00c to 4.50c
Pittsburgh, reinforcing billet	2.00c to 2.10c
Youngstown, reinf. billet, base	1.90c to 2.00c
Chicago, rail steel	2.00c
Mill rail steel	1.85c to 1.95c
Philadelphia, common iron	2.22c
New York, common iron	2.24c
Chicago, common iron	2.00c

Hoops, Bands Strips

Hoops, Pittsburgh, 6 inches and under	2.50c
Bands, Pittsburgh, 6 inches and under	2.50c
Bands, Pittsburgh over 6 in.	2.30c
Hot rolled strip steel, Pittsburgh stamping quality	2.30c
Hot rolled strip steel, Chicago	2.50c to 2.60c
Bands, Chicago, under 6 inches	2.60c
Bands, Chicago, 6 in. and over	2.50c
Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100-inch and heavier, base, Pittsburgh, Cleveland	3.90c
Worcester, Mass., Chicago	4.05c to 4.15c

Cold Finished Steel

Cold finished steel bars, drawn, or rolled Pittsburgh, Chicago carloads	2.50c
Less carload	2.75c
Steel shafting turned and polished Pittsburgh, Chicago	2.60c

Screw stock base Cleveland $1 higher; and Worcester $3 higher than Pittsburgh and Chicago.

Hot Rolled Alloy Steel

Pittsburgh or Chicago

S. A. E. Series—	
2300 (3½ per cent nickel)	4.60c
3100 (Nickel chromium)	3.60c
6100 (Chrome vanadium)	4.40c
6100 (Chrome vanad. spring)	3.85c
9260 (Silico-mang. spring)	3.25c to 3.40c

Rails, Track Material

Standard bessemer rails, mill	$43.00
Standard open-h'th rails, mill	43.00
Relaying rails, St. Louis	24.00 to 31.00
Relaying rails, Pittsburgh	23.00 to 25.00
Light rails, 25 to 45 mill g.t.	35.00
Angle bars, Chicago base	2.75c
Spikes, railroad, Pittsburgh	2.80c
Spikes, small railroad, 7-16-inch and smaller, Pitts.	3.00c to 3.10c
Spikes, boat and barge, Pitts.	3.25c
Spikes, railroad, Chicago	2.90c to 3.00c
Track bolts, Pitts. standard	3.90c to 4.15c
Track bolts, Chicago	3.90c to 4.15c
Tie plates, Pittsburgh	2.35c
Tie plates, Chicago	2.25c

Wire Products

To Jobbers in Carloads

F.o.b. Cleveland and Pittsburgh base

Wire nails	2.65c
Galv'd nails smaller than 1-inch	4.90c
Galv'd nails, 1-inch and over	4.65c
Plain wire	2.50c
Annealed wire	2.65c
Galvanized wire No. 9 gage	3.10c
Barbed wire, painted	3.10c
Barbed wire, galvanized	3.35c
Polished staples	3.10c
Galvanized staples	3.35c

Coated nails, 100 pound kegs, subject to card of extras Feb. 1, 1926 over regular wire nail base.

Woven wire fencing (retailers) 12½ gage, 26-in. high 7-in. bars and 12-in. stays, per 100 rods, f.o.b. Pitts.	$20.03

Joliet, DeKalb and Waukegan, Ill., and Anderson, Ind., prices $1 per ton over Cleveland-Pittsburgh base on products made there; Chicago $1 higher; Duluth $2 higher and Worcester, Mass., and Fairfield, Ala., $3 higher.

Sheets

SHEET MILL BLACK

No. 28, Pittsburgh, base	3.25c to 3.35c
No. 28, Philadelphia, delivered	3.67c
No. 28, Gary, Indiana Harbor	3.45c
No. 28, Chicago delivered	3.50c

TIN MILL, BLACK

No. 28, Pittsburgh	3.25c to 3.35c
No. 28, Gary base	3.45c

GALVANIZED

No. 28, Pittsburgh, base	4.60c
No. 28, Philadelphia, delivered	4.92c
No. 28, Gary, Indiana Harbor	4.70c
No. 28, Chicago, delivered	4.75c

BLUE ANNEALED

No. 10, Pittsburgh, base	2.45c to 2.50c
No. 10, Philadelphia, delivered	2.82c
No. 10, Gary, Indiana Harbor	2.60c
No. 10, Chicago, delivered	2.65c

AUTOMOBILE SHEETS

No. 22, Pittsburgh, base	4.40c

Tin and Terne Plate

Prices per 100-pound box, Pittsburgh

*Tin plate, coke base	$5.50

Gary, Ind., base 10 cents higher.

Long ternes, base	4.85

*This price is subject to quantity differentials established by individual regulations.

Iron and Steel Pipe

Base Discounts Pittsburgh and Lorain, O. to Jobbers in Carloads

	Black	Galv.
1 to 3-inch butt steel	62	50½
1 to 1½-inch, butt iron	30	13

Indiana Harbor, Ind., and Evanston, Ill., 2 points less and $4 per ton higher. Chicago delivered 2½ points less and $5 per ton higher.

Boiler Tubes

Less Carload Discounts—Carloads 4 Points Additional—F.o.b. Pittsburgh Mills

Steel 3¼ to 3½-inch	38½
Charcoal iron, 3¼ to 4½-inch	5
Seamless hot rolled, 3¼ to 3½-inch	46 off

Chain, Piling, Cut Nails

Chain, 1-in. proof coil, Pitts.	6.00c
Sheet piling base, Pittsburgh	2.25c to 2.30c
Cut nails, c. l., f.o.b. mills	2.30c

Cast Iron Water Pipe

Prices per net ton

Class B Pipe

Four-inch, Chicago	$53.20 to 54.20
Six-inch and over, Chicago	49.20 to 50.20
Four-inch, Birmingham	44.00 to 45.00
Six-inch and over, Birmingham	40.00 to 41.00
Four-inch, New York	56.50 to 57.60
Six-inch and over, New York	51.50 to 52.60

Standard fittings, Birmingham base $110.00, 6 to 24-inch, base; over 24-inch, plus $20; 4-inch, plus $20; 3-inch, plus $20; gas pipe fittings, $5 higher.

Class A pipe is $5 higher than Class B

Nuts and Bolts

F.o.b. basing points, Pittsburgh, Cleveland, Birmingham and Chicago.

Hot pressed square tapped or blank	$4.00 off list
Hot pressed hexagon tapped or blank	$4.40 off list
Cold punched square or hexagon blank	$4.10 off list
Cold punched square or hexagon tapped or blank	$4.10 off list

Cold punched U. S. S. semifinished hexagon nuts ⅝-inch and larger 75, 10 and 5 off

Cold punched U. S. S. semifinished hexagon nuts 9/16-inch and smaller 80, 10 and 5 off

Cold finished S. A. E. semifinished ⅝-inch and larger 75, 10, 10 and 5 off

Cold finished S. A. E. semifinished 9/16-inch and smaller 80, 10, 10 and 5 off

CARRIAGE BOLTS
(⅜ x 6-inch, smaller and shorter)

Rolled thread	50, 10 and 10 off
Cut thread (all sizes)	50 and 10 off
Eagle carriage bolts (Eagle list)	65 and 10 off

MACHINE BOLTS
(⅜ x 4-inch, hot pressed nuts)

Rolled thread	60 and 10 off
Cut thread (all sizes)	50, 10 and 10 off

(All sizes cold punched nuts)

Cut thread	45, 10 and 5 off
Lag screws	60, 10 and 10 off
Plow bolts Nos. 3 and 7 heads	50 and 10 off
All other standard heads	50 and 10 off plus 20 per cent
Tap bolts	30 off
Bolt ends with hot pressed nuts	50, 10 and 10 off
Bolt ends with cold punched nuts	45, 10 and 5 off
Blank bolts	50, 10 and 10 off

Rough stud bolts with nuts (250 pieces or more of a size) 40 and 10 off

Stove bolts, 80, 10 and 5 off plus 2½ off in bulk.

Tire bolts	60 and 5 off

SEMIFINISHED CASTELLATED AND SLOTTED NUTS

Per 1000, f.o.b. producer's plant, freight allowed

	S.A.E. Castellated	U.S.S. Slotted
¼	$ 4.40	$ 4.40
5/16	5.15	5.15
⅜	6.20	6.60
7/16	7.90	9.00
½	10.10	10.50
9/16	13.80	14.20
⅝	17.00	17.30
¾	23.50	24.00
⅞	36.00	36.00
1	55.50	58.00
1⅛	89.00	89.00
1¼	126.00	131.00
1⅜	183.50	183.50
1½	210.00	210.00

Larger sizes—Prices on application

HEXAGON CAP SCREWS

Milled	80 and 10 off
Upset	80, 10 and 10 off

SQUARE HEAD SET SCREWS

Milled	80 and 5 off
Upset	80, 10 and 5 off

Rivets

Structural rivets, carloads, Pittsburgh and Cleveland	2.50c to 2.60c
Structural rivets, carloads, Chicago	2.75c
**Rivets, 7/16-inch and smaller Pittsburgh Cleveland	70 and 10 to 70 and 5 off
**Rivets, 7/16 inch and smaller Chicago	70 and 10 to 70 and 5 off

**Some makers quoting 70 off with freight allowed on 300 pounds or more.

Washers

Wrought c.l., Chicago dist.	$6.30 to 6.40 off
Wrought c.l., Pitts. dist	6.25 off
Lock Washers, f.o.b. factory	85 off

Pig Iron

Buyers and Sellers in Temporary Deadlock on Prices—Market Easier in Ohio—More Furnaces Going in

PIG iron buyers are making a determined effort to obtain lower prices for the second quarter, and as most furnace interests have fairly good backlogs to begin that period a large size buying movement is not anticipated immediately. The market is quiet, and there does not appear to be any marked deflection in prices in the principal districts. Cleveland makers have made the second 50-cent reduction since the beginning of the month, now quoting $21, base, furnace, and at least one seller has offered iron below $20.50, base, valley, in outside territory. A Muncie, Ind., melter placed 3000 tons of malleable at around $21.50, delivered, with a lake maker, the price figuring back to about $18.60, furnace. Southern Ohio iron is offered below $21, Ironton.

PITTSBURGH, March 16.—Pig iron buyers here and in nearby districts are in no hurry to close for second quarter. One of the largest inquiries is from the Westinghouse Electric & Mfg. Co. for its Cleveland works, involving 2600 tons of foundry iron for second quarter delivery, as follows: 2000 tons of No. 1 (2.75 to 3.25 silicon) 300 tons of No. 2 (1.75 to 2.25 silicon) and 300 tons of No. 2X (2.25 to 2.75 silicon). The Canton Malleable Iron Co. is inquiring for 1000 tons of malleable and basic, and an unidentified local interest is in the market for 500 to 1000 tons of bessemer. It is understood here the American Sheet & Tin Plate Co. has not yet closed for 1000 tons, partly No. 2 and the remainder No. 2X for its Canton, O., rollworks. The Pressed Steel Car Co. is understood to have placed 1000 tons with its regular source. Other inquiries are for 50 and 100 tons at a time, for prompt delivery, all bringing the full market price, $20.50, base. Iron in hands of middle interests or scrap brokers, now estimated at about 3000 tons, is offered at 50 cents or $1 under the market. The market is unusually strong despite inactivity, because a large buying movement is expected within the next three weeks. The Standard Sanitary Mfg. Co. is not yet ready to issue its second quarter inquiry for Louisville or New Brighton and will defer purchases until later.

Boston, March 16.—Pig iron prices in New England still lack stability to develop buying for second quarter. More activity is apparent, however, as the first quarter draws to a close. A Massachusetts consumer bought 2000 tons of No. 2X (2.25 to 2.75 silicon), divided between Pennsylvania and New York furnaces, and at prices running close to $25, delivered. Nearly all Buffalo furnaces quote $21, base for second quarter, but round tonnages will command some concessions at present. No. 2X Eastern Pennsylvania iron is quoted at $22.25, furnace. Continental iron is at present available for $20 to $20.50 f.o.b. cars Boston.

Philadelphia, March 16.—Despite efforts by consumers to obtain lower pig iron prices, eastern Pennsylvania furnaces are holding firmly to $22, base, furnace, and several lots were sold during the week at this figure. Considerable foreign iron continues to be offered, usually at $20.50 to $21, duty paid, for standard European foundry; $22 for Indian and Dutch. Two inquiries for basic may be closed this week. Several inquiries for low phosphorus iron are pending. Most of the current inquiries for foundry iron are coming from New England and New York.

Pig Iron Prices

Prices per gross ton

Bessemer, valley	$21.00
Bessemer, Pittsburgh	22.76
Basic, valley	20.00
Basic, Pittsburgh	21.76
Basic, Buffalo	20.00 to 20.50
Basic, del., eastern Pa.	22.50
Malleable, valley	20.50
Malleable, Pittsburgh	22.26
Malleable, del., Cleveland	21.50
Malleable, Chicago	23.00
Malleable, Buffalo	21.00
Malleable, del., eastern Pa.	23.25 to 24.00
No. IX, eastern del., Phila.	23.50 to 24.76
No. IX, Buffalo	22.50 to 23.50
No. 1 foundry, Chicago	23.50
No. 2 foundry, valley	20.50
No. 2 foundry, Pittsburgh	22.26
No. 2 foundry, Buffalo	21.00
No. 2 foundry, Chicago	23.00
No. 2 foundry, Granite City	23.50 to 24.00
No. 2 foundry, Ironton furnace	20.50 to 21.00
No. 2 foundry, del., Cleveland	21.50
No. 2 foundry, del., Phila.	22.76 to 23.39
No. 2 foundry, N. J., tidewater	23.39 to 23.76
No. 2X, eastern del., Phila.	23.26 to 23.89
No. 2X, east, N. J., tidewater	23.89 to 24.26
No. 2X, foundry, Buffalo, furnace	21.50
No. 2X, eastern del., Boston	25.65 to 26.65
No. 2X, Buffalo, del., Boston	25.91 to 26.91
Continental foundry f.o.b. Boston	20.50 to 21.50
India, 2.25 to 2.75 silicon, delivered cars, Boston	21.00 to 22.00
No. 2 Alabama, Birmingham	22.00 to 23.00
No. 2 Alabama, Cincinnati	26.69
No. 2 Tenn., Birmingham	21.50
No. 2 Tenn., Cincinnati	25.19
No. 2 southern, Philadelphia	27.01 to 28.01
No. 2 southern, Chicago	28.01
No. 2 southern, Chicago (barge and rail)	26.18
No. 2 southern, Boston (rail and water)	27.91 to 28.91
No. 2 southern, Cleveland	27.01 to 28.01
No. 2 southern, St. Louis	25.42 to 26.42
No. 2X, Virginia, furnace	23.00 to 23.25
No. 2X, Virginia, Phila.	28.17 to 28.42
No. 2X, Virginia, Jersey City	28.54 to 28.79
No. 2X, Virginia, Boston	28.92 to 29.17
Gray forge, eastern Pa.	22.50 to 23.00
Gray forge, val. del. Pitts.	21.76
Low phos., standard, valley	28.00 to 28.50
Low phos., standard, Phila.	24.76 to 27.79
Low phos., Lebanon, furnace	23.00 to 24.00
*Low phos., English	24.26 to 24.76
Charcoal, Birmingham	31.00 to 32.00
Charcoal, Superior, Chicago	29.04

Silvery iron Jackson county, Ohio furnace, 5 per cent $27.50; 6 per cent $28.50; 7 per cent $29.50; 8 per cent $30.50; 9 per cent $32.00; 10 per cent $34.00; 11 per cent $36.00; 12 per cent $38.00; 13 per cent $40.00; and 14 per cent $42.00.

Bessemer ferrosilicon, Jackson county, Ohio, furnace, 10 per cent $36.00; 11 per cent $38.00; 12 per cent $40.00; 13 per cent $42.00; 14 per cent $44.00; 15 per cent $46.00; 16 per cent $49.00; 17 per cent $51.50.

*Duty paid, delivered Philadelphia consumers.

Buffalo, March 16.—Large consumers of pig iron are slow in covering requirements and it is apparent they are trying to break the $21 base price which Buffalo makers are quoting. At least 8000 tons is pending. All makers are holding firm for the $21 base with differentials. Sixteen of 21 furnaces in the district are making iron.

Cleveland, March 16.—An easier price situation has developed here, while melters continue to wait. Cleveland furnaces have made the second reduction since March 1, now quoting $21, base furnace, equivalent to $21.50 delivered in the local switching area. In selling outside this territory in competition with valley furnaces it is understood prices below $20.50, valley base, have been quoted. A Muncie, Ind., foundry closed with a lake furnace for 3000 tons of malleable for second quarter at a price around $21.50, delivered, equivalent to $18.60, furnace. Other lake furnaces, west of Cleveland, are understood to be holding to $22, base furnace. Hand-to-mouth buying continues to characterize the market; sales during the week reported by furnace interests with headquarters here total approximately 10,000 tons. Inquiries generally are for small lots. The Westinghouse Electric & Mfg. Co. is in the market for about 2600 tons of various grades for its Cleveland plant.

The Ford Motor Co. is preparing to blow out one of its stacks at River Rouge, Mich., for relining. It is understood to have 50,000 to 60,000 tons of iron piled on its banks.

Cincinnati, March 16.—Ability of melters to go outside this district and to buy pig iron under $21 Ironton, has been a slackening influence in the market. It is reported the Muncie Malleable Co., Muncie Ind., bought 3000 tons of malleable on a basis below $20 Ironton from a lake furnace interest for second quarter. While some resale northern foundry iron still is available at $20.50 Ironton, furnace interests in the southern Ohio group are adhering strictly to the $21 quotation. Inquiry pending approximates 4000 tons. Little change is noted in the southern situation. Tennessee iron is quoted $21.50 and

(*Concluded on Page* 731)

Coke

Furnaces and Foundries More Active in Covering Requirements—Distress Lots Appear

SOME contracts for beehive furnace coke for second quarter have been closed at $3.25 to $3.50, and contracts for the foundry grade are more numerous at $5 to $5.50. Distress tonnages continue to appear, as production has not been sufficiently curtailed, makers say. Several eastern furnaces are in the market. By-product prices also are easier.

Pittsburgh, March 16.—Curtailed production of beehive coke has not yet reached a point preventing distress tonnages appearing in this and other markets. Middle interests still are able to buy standard coke in small lots on track at $2.90 and are selling for $3 to $3.15. Coke to be produced, however, is quoted at $3.25, minimum, to $3.50. Somewhere between those two levels is the figure applying on some second quarter contracts recently closed, including one for the E. G. Brooke Iron Co. The A. M. Byers Co. has renewed its coke arrangements with the same source as did the Clinton Iron & Steel Co. The former will start up soon, the latter started up last Friday. A local steelworks interest is about to negotiate its April needs for one stack, since its by-product output is not yet sufficiently high. One or two eastern blast furnaces are inquiring for 8500 to 10,000 tons monthly for second quarter Other valley iron producers show no anxiety about closing. One or two medium sulphur coke contracts are up for consideration, including that for a large Canadian nickel interest. Additional second quarter foundry coke contracting is being done at $5 to $5.50. Other foundry coke is available at $4.50, minimum. Two premium brands are held at $5.50 in open top cars and $5.75 in box cars.

Production of coke in the Connellsville region for the week ended March 6 was 199,550 tons, compared with 206,000 tons in the preceding week, according to the *Connellsville Courier*.

Boston, March 16.—Demand for foundry coke is steady despite the fact many melters have started reducing their reserve stocks. Both the new England by-product producers continue to operate close to capacity with domestic shipments still running behind. The price of foundry by-product coke is unchanged at $13, delivered.

Cincinnati, March 16.—With the season for domestic coke virtually at an end, demand has dropped and price reductions are anticipated. The movement of foundry fuel continues fair, while furnace coke is undergoing a lull, which has resulted in production of this grade being curtailed in the Wise county district. While producers of by-product coke report little new business, their shipments are holding up satisfactory.

Detroit, March 16.—The local fuel situation continues favorable. Considerable anthracite is being received at present but the demand is not great. No change is noted in the foundry by-product coke situation. The price is $8.50, ovens.

Chicago, March 16.—By-product coke operations have not tapered off to any degree since the end of the anthracite coal strike and demand is such that the ovens will be pressed to meet their obligations over the remainder of the month. By-product foundry coke is quoted at $10.50, Chicago ovens, or $11, delivered Chicago.

St. Louis, March 16.—Shipments of metallurgical and domestic coke continue in large volume, and the by-product interests are behind on deliveries. An improvement in demand for foundry coke in the South and Southwest is noted, melters having run low on supplies and not having contracted for second quarter. Prices are unchanged.

Birmingham, Ala., March 15.—Coke demand continues good and production is steady. Quotations are firm at $5.50 for the foundry grade, with an occasional sale at $6. Transportation facilities are good.

Coke Prices

Beehive, Ovens

Prices per net ton

Connellsville furnace	$ 3.25 to 3.50
Connellsville foundry	4.50 to 5.00
New River foundry	7.50
New River furnace	5.25 to 5.50
Wise county furnace	4.00 to 4.50
Wise county foundry	5.00 to 5.50
Alabama foundry	5.50 to 6.00
Alabama furnace	5.00 to 5.25

By-Product

Foundry, Newark, N. J.; del.	$11.01 to 11.52
Foundry, Chicago, ovens	10.50
Foundry, New England, del.	13.00
Foundry, St. Louis	10.00
Foundry, Granite City, Ill.	10.00
Foundry, Birmingham	5.50 to 6.00
Foundry, Indianapolis, del.	11.25

Ferroalloys

Ferromanganese Again Reduced to $95—10,000 Tons Sold

New York, March 16.—About 10,000 tons of ferromanganese, it is estimated, has been sold since the reduction from $115 to $110, duty paid tidewater two weeks ago and the subsequent cut to $95 last week. These reductions, it is understood, have resulted in readjustments of prices on old contracts. Consumers who placed yearly contracts in the fall are getting the benefit of the new prices. Further substantial business is expected as several large tonnages are pending. The principal participants in this buying movement have been the Electrometals Co. and E. J. Lavino & Co. English ferromanganese continues at $110, duty paid tidewater.

Special ferroalloys are in a steady market. Shipments are good and prices unchanged.

Wolframite is weak, a number of prices being heard under $12 a short ton unit duty paid.

Philadelphia, March 16.—Both domestic and Norwegian makers of ferromanganese have again reduced prices by $5 and now are quoting $95, duty paid tidewater. It is understood this price has been offered for the entire year with the guarantee of protection against declines.

Pittsburgh, March 16.—Sharp price competition on ferromanganese between domestic producers brought about another reduction of $5 per ton to $95 seaboard and numerous sales the past week. Following adoption of a $100 seaboard figure March 6, E. J. Lavino & Co. sold several hundred tons to different nearby consumers. On March 12 it reduced its price further by $5 per ton because of developments in the meantime, another seller having dipped below $100 in a few instances. The orders taken consequently were revised to the $95 seaboard base price.

Specifications against 50 per cent ferrosilicon contracts are coming in at a fairly rapid rate. In ferrosilicon a carload of 9 per cent was sold last week at market prices. One nearby user wants a carload of 10 per cent.

Chicago, March 16.—Domestic ferromanganese is being sold in this district at $95, seaboard. Sales the past few days aggregate several hundred tons, with Milwaukee a relatively more active buyer than Chicago. Foreign makers are still quoting $110.

Ferroalloy Prices

†Ferromanganese 78 to 82 per cent, tidewater, or furnace first hand and resales	$95.00 to 110.00
Ferromanganese delivered Pittsburgh	99.79 to 114.79
Spiegeleisen 19 to 21 per cent domestic furnace or tidewater	34.00
Ferrosilicon, 50 per cent contract freight allowed	85.00
Ferrotungsten standard, per pound contained	1.14 to 1.18
Ferrochrome, 60 to 70 chromimum, 6 to 8 carbon, cents per pound contained, delivered	11.00 to 11.50
Ferrovanadium, 30 to 40 per cent per pound estimated, according to analysis	3.25 to 4.00
Ferro-carbon-titanium, car lots, producer's plant, net ton	200.00
Ferrophosphorus, electrolytic, per ton, carload, 17 to 19 per cent, Rockdale, Tenn., basis (18 per cent material)	91.00
Ferrophosphorus, electrolytic, per ton, carload, 23 to 25 per cent, f.o.b. Anniston, Ala., (24 per cent materials)	122.50

†Duty paid.

The Market Section

Plates

More Tonnage Placed, and Prices Appear Firmer—Eastern Makers Go on 1.90c Basis

EASTERN platemakers have raised their price for second quarter to 1.90c, Pittsburgh, after closing a considerable tonnage at the prior range of 1.80c to 1.90c. Some improvement is noted in the general tonnage placed. Western car builders have specified 50,000 tons of steel, mainly plates. More tank work is in evidence. Many government boats are up for bids.

PLATE PRICES, PAGE 716

Pittsburgh, March 16.—Miscellaneous plate orders continue plentiful. Large tonnage orders outside of those used for car building are rare. Larger lots will be involved, however, in a number of towboats and barges to be purchased soon by the Belfont Steel & Wire Co., and in the 20 steel barges for the United States engineers at St. Louis, as well as in the 56 steel pontoons for the United States engineers at Philadelphia. The plate price is unchanged at 1.80c to 1.90c since the 1.85c minimum established in some directions is not altogether firm in meeting eastern competition.

Boston, March 16.—Plate deliveries by eastern mills are more extended. New England inquiry shows improvement. Prices are unchanged at 1.80c Pittsburgh, or 2.165c delivered. It is reported bids will be taken in April for 5000 tons for a bridge at Bath, Me.

New York, March 16.—Second quarter plate inquiries are more numerous. all makers are asking 1.90c, Pittsburgh, for second quarter, but the price situation is not yet clearly defined. One eastern mill refuses to shade 1.90c on any business. Others quote 1.80c on prompt tonnage. The largest inquiry involves 3000 tons for second quarter for the Standard Oil Co. of New Jersey. The Sun Oil Co. Philadelphia, is inquiring for three 55,000-barrel tanks, involving about 700 tons of plates.

Philadelphia, March 16.—Two eastern plate mills have raised their price $2 a ton for all deliveries and now are asking 1.90c, Pittsburgh. A heavy tonnage was placed just prior to the advance. Plates, however, still are obtainable in some quarters at 1.80c.

Chicago, March 16.—Western car builders have specified 50,000 tons of car steel, mostly plates, and have as much tonnage again to specify. In addition, 2050 cars requiring 20.000 tons of steel have just been taken by western builders. Considerable tank work is coming out of the Southwest, including 3000 tons at Houston, Tex. Gas holders in Michigan and Connecticut require 4500 and 1000 tons of plates respectively. An important maker is promising three to four weeks delivery on sheared plates but asks much longer on universal mill plates. The market is quoted at 2.10c, Chicago.

St. Louis, March 15.—The Missouri, Kansas & Texas railroad is in the market for its second quarter tank plate requirements.

Cleveland, March 16.—Plates show further signs of firming up in price. Most producers continue to openly quote 1.90c, Pittsburgh, or 2.09c, Cleveland, and an increasing number of small sales are being made on this basis. However, there is still some outstanding quotations below 1.90c. The Pennsylvania railroad inquiry for 200 locomotives which is being bid upon in this district involves 10,000 tons or more of plates. A small lake barge just awarded requires 150 tons.

CONTRACTS PLACED

350 tons, standpipe and supports for Seattle, to Puget Sound Machinery Depot.
600 tons, miscellaneous orders, to Riter-Conley Co.
100 tons, elevated tanks for the Florida East Coast railroad, to the Pittsburgh-Des Moines Steel Co.

CONTRACTS PENDING

3000 tons, two riveted pipe lines for unidentified interest; pending.
1000 tons, estimated, for a fleet of diesel-driven towboats and barges for the Belfont Steel & Wire Co., Ironton, O.; bids soon to be asked.
750 tons, five barges for unidentified interest in the Pittsburgh district; pending.
500 tons, 20 small steel barges for the United States engineers, St. Louis; bids close March 20.
500 tons, 56 steel pontoons and accessories for the United States engineers, Philadelphia; bids in.
300 tons, scout cruiser at Washington navy yard; bids by bureau of supplies and accounts, navy department show Carnegie Steel Co. low at $101,074.04. Other bids were $171,344.05 by Bethlehem Steel Co. and $200,275.45 by Midvale Co.
200 tons, pipe line, The Dalles, Oreg.; bids opened.

Semifinished

Sellers and Buyers Negotiating Second Quarter Business—Valley Reaffirms Prices

INQUIRIES for semifinished steel are more numerous, a number of strip steel makers and sheet mills being in the market. Users generally are seeking prices on second quarter requirements. Valley and Pittsburgh interests have opened books for second quarter, reaffirming $36 on sheet bars and $35 on billets and slabs. Some makers of forging billets have cut prices.

SEMIFINISHED STEEL PRICES, PAGE 716

Pittsburgh, March 16.—Steps are being taken this week by sellers of semifinished steel to get on their books the requirements of regular customers. The list of buyers about to close includes a number of strip steel makers and some of the non-integrated sheet manufacturers. On 4 x 4-inch rerolling billets and 2 x 8-inch slabs $35 is the unchanged figure for second quarter, and on small billets as well as sheet bars $36 applies. On forging billets one or two makers have adopted a $40 price which is $1 less than formerly. Practically all first quarter forging billet tonnage has been specified and users of forging billets are protecting themselves on tonnage for the second quarter period commensurate with their first quarter needs. Wire rods are unchanged at $45 and while in a few instances fairly large tonnages remain to be taken out on first quarter contracts, a number of users are getting ready to close their second quarter arrangements. Skelp is quoted at 1.85c to 1.90c, and some wheel skelp business has been closed as well as some tubular skelp for shipment to Canada by a large local interest.

Philadelphia, March 16.—Buying of billets is restricted to small lots for prompt shipment. Rerollers are $35 to $36, Pittsburgh, while most sales of forging billets are made at $41, Pittsburgh. Demand for rods for second quarter is quiet.

Cleveland, March 16.—Negotiations for sheet bars, billets and slabs for second quarter apparently have been undertaken by some producers and users, that may make the market more definite within a few days. The leading mill interest here has been quoting $36 on sheet bars and $35 on billets and slabs. A valley producer has opened its books for second quarter on this basis and is understood to have closed with several of its customers.

Youngstown, O., March 16.—One producer of semifinished steel has opened books for second quarter requirements at prices unchanged from last quarter. These include $36 for sheet bars and small billets and $35, Youngstown, for standard billets and slabs. Another mill reports its customers have made no arrangement for forward sheet bar tonnages but that action probably will be taken this week or next. Specifications are being placed in fair volume.

Iron and Steel Scrap Prices

Corrected to Tuesday Noon. Gross Tons Delivered to Consumer

Steel Works Scrap

HEAVY MELTING STEEL

Birmingham	$13.00 to 14.00
Boston (dealers)	11.00 to 11.50
Buffalo	15.00 to 15.50
Buffalo, No. 1	16.00 to 16.50
Chicago	14.00 to 14.25
Cincinnati (dealers)	12.50 to 13.00
Cleveland, No. 1	14.50 to 15.00
Cleveland, No. 2	13.50 to 14.00
Detroit	14.75 to 15.25
Eastern Pennsylvania	15.50 to 16.00
Bethlehem delivery	15.50
New York (dealers)	11.50 to 12.00
Pittsburgh	17.50 to 18.00
St. Louis	13.50 to 14.00
Valleys, No. 1	17.00
Valleys, No. 2	15.00 to 16.00

COMPRESSED SHEETS

Buffalo	14.25 to 14.75
Chicago	12.00 to 12.50
Cleveland	13.50 to 14.00
Detroit	12.50 to 13.00
Pittsburgh	15.50 to 16.00
Valleys	15.50 to 16.00

BUNDLED SHEETS

Buffalo	13.50 to 14.00
Cincinnati (dealers)	9.00 to 9.50
Cleveland	11.50 to 12.00
Eastern Pennsylvania	13.50
Pittsburgh	14.50 to 15.00
St. Louis	8.00 to 8.50

SHEET CLIPPINGS, LOOSE

Chicago	9.00 to 9.50
Cincinnati	8.00 to 8.50
Detroit	9.75 to 10.25

STEEL RAILS, SHORT

Birmingham	14.00 to 15.00
Buffalo	17.00 to 17.50
Chicago	17.75 to 18.25
Cincinnati (dealers)	17.50 to 18.00
Cleveland (over 6 ft.)	15.00 to 16.00
Detroit	17.00 to 17.50
St. Louis	17.00 to 17.50

STOVE PLATE

Birmingham	14.00 to 14.50
Boston (consumers)	13.50 to 14.00
Buffalo	15.00 to 15.50
Chicago	16.00 to 16.50
Cincinnati (dealers) (net)	9.00 to 9.50
Cleveland	13.00 to 13.50
Detroit (net tons)	13.25 to 13.75
Eastern Pennsylvania	14.50
New York (dealers)	10.25 to 10.75
Pittsburgh	13.50 to 14.00
St. Louis	14.50 to 15.00

LOW PHOSPHORUS

Buffalo	18.50 to 19.00
Cincinnati (dealers)	17.00 to 17.50
Eastern Pennsylvania	20.00 to 21.00
Pitts. billet and bloom crops	21.50 to 22.00

SHOVELING STEEL

Chicago	14.00 to 14.25
Pittsburgh	13.00 to 13.50
St. Louis	13.50 to 14.00

KNUCKLES, COUPLERS, SPRINGS

Chicago	17.25 to 17.75
Eastern Pennsylvania	19.00 to 21.00
Pittsburgh	19.50 to 20.00
St. Louis	14.50 to 15.00

FROGS, SWITCHES, GUARDS

Chicago (cut)	15.25 to 15.75
Eastern Pennsylvania	16.00 to 16.50
St. Louis	15.00 to 15.50

ANGLE BARS—STEEL

Buffalo	16.50 to 17.00
Chicago	16.50 to 17.00
St. Louis	15.00 to 15.50

Iron Mill Scrap

RAILROAD WROUGHT

Birmingham	$12.00 to 13.00
Boston (dealers)	13.00 to 13.50
Buffalo, No. 1	14.00 to 14.50
Buffalo, No. 2	15.50 to 16.00
Chicago, No. 1	14.50 to 15.00
Chicago, No. 2	14.00 to 14.25
Cincinnati, No. 1 (dealers)	9.50 to 10.00
Cleveland, No. 1	13.50 to 14.00
Eastern Pennsylvania	18.00
New York, No. 1 (dealers)	14.50 to 15.00
Pittsburgh, No. 1	14.00 to 14.50
Pittsburgh, No. 2	17.50 to 18.00
St. Louis, No. 1	13.00 to 13.50
St. Louis, No. 2	13.50 to 14.00

WROUGHT PIPE

Boston (dealers)	11.00 to 11.50
Buffalo	15.00 to 15.50
Eastern Pennsylvania	16.00 to 16.50
New York (dealers)	12.25 to 12.75

YARD WROUGHT

Boston	12.00 to 12.50
Eastern Pennsylvania	17.00

BUSHELING

Buffalo	14.25 to 14.75
Chicago, No. 1	12.25 to 12.75
Chicago, No. 2	9.00 to 9.50
Cincinnati, No. 1 (dealers)	9.50 to 10.00
Cleveland, No. 1	12.00 to 12.50
Cleveland, No. 2	11.50 to 12.00
Eastern Pennsylvania	14.00 to 15.00
Pittsburgh, No. 1	15.00
St. Louis, No. 1	11.75 to 12.25

MACHINE SHOP TURNINGS

Birmingham	8.00 to 8.50
Boston (chemical)	8.50 to 9.00
Buffalo	11.00 to 11.50
Chicago	9.50 to 10.00
Cincinnati (dealers)	8.00 to 8.50
Cleveland	11.50 to 12.00
Detroit	10.25 to 10.75
Eastern Pennsylvania	14.00
New York (dealers)	9.00 to 10.25
Pittsburgh	13.00 to 13.50
St. Louis	7.50 to 8.00

CAST IRON BORINGS

Birmingham (chemical)	15.50 to 16.50
Birmingham (plain)	8.00 to 9.00
Boston (chemical)	11.00 to 11.25
Boston (dealers)	8.50 to 9.00
Buffalo	12.25 to 12.75
Chicago	12.00 to 12.50
Cincinnati (dealers)	8.50 to 9.00
Cleveland	11.50 to 12.00
Detroit	10.75 to 11.25
Eastern Pennsylvania	14.00
Eastern Pennsylvania (chem.)	15.50 to 16.00
New York (dealers)	9.25 to 10.25
Pittsburgh	13.00 to 13.50
St. Louis	10.75 to 11.25
Valleys	12.50 to 13.00

MIXED BORINGS AND TURNINGS
For blast furnace use

Boston (dealers)	8.00 to 8.50
Buffalo	12.25 to 12.75
Cincinnati (dealers)	8.00 to 8.50
Cleveland	11.50 to 12.00
Detroit	10.75 to 11.25
Eastern Pennsylvania	12.50 to 13.50
New York (dealers)	9.75 to 10.25
Pittsburgh	13.00 to 13.50

PIPES AND FLUES

Chicago	12.00 to 12.50
Cincinnati (dealers)	8.50 to 9.00
Cleveland	11.00 to 11.50
St. Louis	10.50 to 11.00

RAILROAD GRATE BARS

Buffalo	13.50 to 14.00
Chicago	15.00 to 15.50
Cleveland	13.50 to 13.75
Eastern Pennsylvania	14.50
New York (dealers)	11.25 to 11.75
St. Louis	13.00 to 13.50

FORGE FLASHINGS

Boston (dealers)	9.50 to 10.00
Buffalo	13.00 to 13.50
Chicago	10.00 to 10.50
Cleveland (under 10 in.)	12.75 to 13.25
Cleveland (over 10 in.)	12.75 to 13.25
Detroit	10.50 to 11.00
Pittsburgh	14.00 to 14.50

FORGE SCRAP

Boston (dealers)	9.00 to 9.50
Chicago	18.00 to 18.50
Eastern Pennsylvania	14.50 to 15.00

ARCH BARS AND TRANSOMS

Chicago	23.00 to 23.50
St. Louis	19.50 to 20.00

Iron Steel Works Scrap

AXLE TURNINGS

Boston dealers	$9.50 to 10.00
Buffalo	14.50 to 15.00
Chicago	14.50 to 15.00
Cleveland	13.75 to 14.25
Eastern Pennsylvania	15.00
Pittsburgh	16.00 to 16.50
St. Louis	11.00 to 11.50

STEEL CAR AXLES

Birmingham	19.00 to 20.00
Boston (shipping point)	18.00 to 18.50
Buffalo	16.50 to 17.00
Chicago	19.50 to 20.00
Cleveland	17.50 to 18.00
Eastern Pennsylvania	24.00 to 25.00
Pittsburgh	22.50 to 23.00
St. Louis	20.00 to 20.50

SHAFTING

Boston (shipping point)	17.50 to 18.00
Chicago	19.75 to 20.25
Eastern Pennsylvania	22.00 to 23.00
New York (dealers)	17.50 to 18.00
St. Louis	17.25 to 17.75

Iron Foundry Scrap

CAR WHEELS

Birmingham, iron	$16.00 to 16.50
Boston (consumers)	17.50 to 18.00
Buffalo, iron	15.50 to 16.00
Buffalo, steel	16.50 to 17.00
Chicago, iron	16.75 to 17.25
Chicago, steel	18.00 to 18.50
Cincinnati	12.50 to 13.00
Eastern Pennsylvania	18.00 to 18.50
New York iron (dealers)	14.50 to 15.00
Pittsburgh, iron	18.00 to 18.50
Pittsburgh, steel	19.50 to 20.00
St. Louis, iron	16.50 to 17.00
St. Louis steel	17.00 to 17.50

NO. 1 CAST SCRAP

Birmingham, cupola	17.00 to 18.00
Boston	19.00 to 19.50
Buffalo	15.50 to 16.00
Chicago, No. 1 machinery	18.75 to 19.25
Chicago No. 1 railroad or agricultural	18.00 to 18.50
Cincinnati No. 1 Machinery cupola (net tons dealers)	18.50 to 19.00
Cleveland, cupola	17.25 to 17.75
Detroit (net tons)	15.00 to 15.50
Eastern Pennsylvania, cupola	18.00 to 18.50
New York, cupola (dealers)	15.00 to 15.50
Pittsburgh, cupola	17.00 to 17.50
San Francisco, delivered	20.00 to 21.00
Seattle	17.00
St. Louis, railroad	16.50 to 17.00
St. Louis, agricultural	16.25 to 16.75
St. Louis, machinery	18.50 to 19.00
Valleys	17.50

HEAVY CAST

Boston	17.50 to 18.00
Buffalo (breakable)	14.50 to 15.00
Cleveland	13.00 to 13.25
Detroit (Automobile) (net tons)	20.00 to 20.50
Eastern Pennsylvania	16.50
New York (dealers)	14.00 to 14.50
Pittsburgh	14.50 to 15.00

MALLEABLE

Boston, railroad	19.50 to 20.00
Buffalo	18.00 to 18.50
Chicago, agricultural	16.50 to 17.00
Chicago, railroad	17.50 to 18.00
Cincinnati, railroad (dealers)	14.50 to 15.00
Cincinnati, agricultural (dealers)	18.00 to 18.50
Cleveland, agricultural	18.00 to 18.50
Cleveland, railroad	19.00 to 19.50
Detroit	15.50 to 16.00
Eastern Pennsylvania, railroad	17.00
Pittsburgh, railroad	18.50 to 19.00
St. Louis, agricultural	13.50 to 14.00
St. Louis, railroad	15.50 to 16.00

Miscellaneous Scrap

RAILS FOR ROLLING
5 feet and over

Birmingham	$15.00 to 16.00
Boston (dealers)	12.50 to 13.50
Buffalo	17.00 to 17.50
Chicago	16.50 to 17.00
Cleveland	17.00 to 17.25
Eastern Pennsylvania	17.50 to 18.00
New York	14.00 to 14.50
Pittsburgh district	19.00 to 19.50
St. Louis	16.25 to 16.75

LOCOMOTIVE TIRES

Chicago, No. 1	18.00 to 18.50
Chicago, cut	18.00 to 18.50
St. Louis, No. 1	16.50 to 17.00

LOW PHOSPHORUS PUNCHINGS

Chicago	17.25 to 17.75
Eastern Pennsylvania	19.00 to 20.00
Pittsburgh	20.00 to 20.50

Scrap

Steady Prices Indicate Market Decline Is at End—Supplies Available Are Large

LITTLE change has taken place in the situation in iron and steel scrap. Prices are fairly steady, with little change, and consumers continue to hold off buying more than current needs, at prices often dictated by distress conditions. Speculation is absent and offerings are larger than the market can absorb. Sentiment is better and improvement is expected.

Chicago, March 16.—Iron and steel scrap does not reflect the improved feeling in pig iron and finished steel, and drags along with prices heavy and demand light. Dealers believe present low prices will lessen the spring inflow of scrap from country districts, but the high rate of industrial operations brings a steady flow to an already over-burdened market. A consumer continues to buy heavy melting steel he needs at $14.25, while dealers are trading at $14 to $14.10. A foundry has bought No. 1 railroad cast at $18, gross. A sale of stove plate at $16 is claimed by one dealer. The market generally is unchanged at $14 to $14.25 for melting steel.

Boston, March 16.—A definite improvement in inquiry for iron and steel scrap is apparent in the New England market, and sales of cast grades show better volume. A Connecticut foundry took four cars of textile and No. 1 machinery at $19.75 delivered. Heavy melting steel is still without consumers market at the prices asked.

New York, March 16.—Scrap prices are unchanged. The tone of the market is easy, with trading dull. There has been some buying of turnings and skeleton steel for Eastern Pennsylvania, dealers paying $14, delivered. One consumer has withdrawn and another has reduced his buying price so that $13.50, delivered is again being offered by dealers.

Philadelphia, March 16.—Sales totaling 5000 to 10,000 tons of heavy melting steel have been sold at $16.50 delivered Eastern Pennsylvania. Otherwise buying is small. Two mills which recently padi $14 for bundled sheets and turnings again are offering $13.50.

Buffalo, March 16.—A trifle more interest in scrap offerings is noted this week. Some consumers might pay up to $15.50 for a tonnage of heavy melting steel, dealers say, although last purchases were reported to have been at $15.

Pittsburgh, March 16.—A few sales of heavy melting steel scrap representing a fair tonnage in lots of 1000 to 2000 tons have been made here at $18. It is easy to sell short at $17.50 but dealers hesitate to do so because of the difficulty they have in picking up tonnages even at $17.50. The fact that $17.50 is being offered by a Midland Pa., consumer and other nearby users, and that steel on the Norfolk & Western railroad list brought more than $17.65, Pittsburgh, would indicate that $18 is nearer the quotable market today than any other figure.

Cleveland, March 16.—Movement of iron and steel scrap continues in small volume. Some trading is being done among dealers but consumers refuse to reveal interest, claiming to be well covered for present needs and giving little attention to anything beyond the immediate future. Prices, while unchanged, are soft.

Youngstown, O., March 16.—Despite purchases of scrap by two steelmakers prices of melting steels are lower and the market, influenced by pig iron prices, is still sagging.

Cincinnati, March 16.—While spot buying does not exist in iron and steel scrap, consumers with contracts are accepting tonnages with a fair degree of regularity. The movement centers on heavy melting steel and the cast grades.

Detroit, March 16.—Iron and steel scrap continues weak. Little interest is shown by buyers and trading is limited. Small tonnages continue to make up the bulk of shipments.

St. Louis, March 15.—Iron and steel scrap continues listless, buyers and sellers being disposed to await developments. Sales of real tonnage were absent, and transactions involving even small lots are increasingly rare. As compared with recent weeks, however, the market has improved to the extent that no further price reductions are recorded. The belief seems to prevail among melters that the bottom has about been reached, based on the fact that all offers to buy below present levels have been rejected.

Railroad lists include the following: Frisco, 800 tons; Missouri, Kansas & Texas, 1800 tons; Kansas City Southern, 700 tons; Pullman Co., 200 tons; Chicago & Alton, 2000 tons; Texas & Pacific, 2000 tons; Northern Pacific, 3000 tons; International & Great Northern, 1500 tons; Southern, 7000 tons and Chesapeake & Ohio, 10,500 tons.

Birmingham, Ala., March 15.—Iron and steel scrap is quiet as to selling, but melters are taking in tonnages on their contracts to meet current needs.

Sheets

Tone of the Market Improves—More Inquiries Out—Some Valley Makers Quoting on Mill Basis

A BETTER tone is noted in the sheet market, with more inquiries out, and shipments continuing on a fairly high level. The price situation is unchanged from a week ago, the larger mills quoting the full levels. Smaller interests are dipping under the market particularly on black. Some of the valley mills are quoting the full prices, but on a mill basis.

SHEET PRICES, PAGE 716

Youngstown, O., March 16.—A slight improvement is noted in the sheet market this week. Inquiry for prompt and second quarter tonnages is in better volume and a more cheerful tone is apparent. While the tonnage placed is not large individually, the number of consumers specifying shows an increase. Some mills are in a better position from the standpoint of tonnage than at any time this year while other producers lack tonnage. As a reuslt of this condition the market on black continues quotable at 3.25c to 3.35c, Pittsburgh. Some producers are quoting on a mill base. Blue annealed is quoted 2.45c to 2.50c and galvanized 4.60c, Pittsburgh. Resale galvanized is offered for less. Transportation conditions are favorable and few consumers are specifying in excess of immediate requirements. The volume of orders still is sufficient to keep district operations about 80 per cent. Some fairly attractive tonnage is being placed by automobile body builders while metal furniture specifications show no decline. Full finish sheets are quoted 4.40c, Pittsburgh. Consumers in many cases are urging quick shipment of tonnage which originally was desired the latter part of March.

Boston, March 16.—Sheet sales have dropped to a low point and weakness has again appeared in prices of black sheets. A round tonnage sale is reported during the week at 3.20c, Pittsburgh. Small lots have been sold at 3.30c. Galvanized sheets are firm at 4.60c, Pittsburgh.

Philadelphia, March 16.—Sheet consumers are slow in closing for second quarter. Current orders are less than shipments. Quotations are unchanged.

Buffalo, March 16.—Most sheet makers have restored their second quarter price on black to 3.35c, Pittsburgh. Some sales were made at 3.30c or possibly 3.25c to large users, to build up second quarter backlogs. Galvanized sheets hold at 4.60c. Mill opera-

tion in the district is estimated at 80 per cent of capacity.

Chicago, March 16.—Specifications for all classes of sheets ran ahead of shipments last week, with one western maker exceeding by a two to one margin. Blue annealed continues the strongest, with western mills booked up many weeks. Jobbers' stocks, especially blue annealed, appear to have been moving and makers are being pressed for shipments. Western sheet mills are operating practically at capacity. The market is 4.75c, Chicago, for galvanized, 3.50c for black and 2.65c for blue annealed.

Pittsburgh, March 16.—Manufacturing lines are taking larger tonnages of sheets. While sheets for roofing and other building purposes are not in heavy demand as yet, pick up is expected as spring advances. Other consuming lines are normal and some are absorbing abnormally large tonnages for this season of the year. Last week more automotive tonnage found its way to makers' books, although the automobile companies still are buying on a hand-to-mouth basis. Agricultural implement makers, electrical sheet users, metal furniture manufacturers, car builders, and makers of galvanized sheet articles are taking their quotas on a slighlty increasing scale. Sheet mill operations continue to average between 85 and 90 per cent, with the American Sheet & Tin Plate Co. slightly in excess of 80 per cent. Prices are firmer than ever, and producers are adhering to the 3.35c minimum on black sheets and 4.60c on galvanized. Blue annealed is unchanged at 2.50c and full finished at 4.40c, both grades being exceedingly firm.

Cleveland, March 16.—Local sheet sellers find a spotty market. Full finished bookings are good, although hand-to-mouth. No change in 4.40c Pittsburgh on autobody sheets is reported. Black sheets are weak although leading makers are holding to the 3.35c base. One sale of from 1500 to 1800 tons to three makers was made at 3.20c, the tonnage going to western New York. Another sale of 1000 tons, specified for delivery throughout 1926 was reported at the full 3.35c price. Blue annealed and galvanized prices are firm at 2.50c and 4.60c Pittsburgh.

Tin Plate

Users Specifying Heavily—Operations At High Rate

TIN PLATE PRICES, PAGE 716

Pittsburgh, March 16.—With the American Sheet & Tin Plate Co. operating at 90 to 95 per cent and several of the larger independent makers at 95 to 100 per cent, tin plate leads all finished steel lines, except possibly merchant steel bars. Specifications are coming along rapidly and users are commencing to specify against their recent increases in commitments. This assures the tin plate makers good operations for some time. Prices are firm, $5.50 being the open market figure here.

Strip Steel

Buying Larger and More Diversified—Covering Second Quarter

STRIP PRICES, PAGE 716

Pittsburgh, March 16.—During the past three days orders for hot and cold strip steel have increased. Demand is diversified although an increase has been made in automotive bookings. Contracting is proceeding quietly for second quarter since there was no change in the price. The present levels are firm, 3.90c on cold and 2.30c on hot. Operations average around 80 per cent.

Bar Mill to Open April 1

Birmingham, Ala., March 15.—The new bar mill of the Gulf States Steel Co., at Gadsden near here is about completed, and operation is scheduled for April 1. This plant will produce steel bars, rods, angle bars, concrete reinforcing bars and other merchant steel, the capacity to be 10,000 tons per month. The new finishing mills will take up the output of steel of the six open-hearth furnaces.

Tri-Clover Machine Co., Kenosha, Wis., has increased capital from $50,000 to $75,000.

Pipe

Standard Oil Buys 45,000 to 50,000 Tons of Line Pipe—Cast Demand Continues Heavy

STANDARD Oil Co. of New Jersey featured the tubular products market this week with award of 45,000 to 50,000 tons of 22-inch line pipe for a 178-mile line. Merchant pipe orders are heavier. Cast demand is heavy. San Diego, Calif., is in the market for 25,000 tons, and two lots of 5850 and 3610 tons on the Pacific Coast went to American makers. Prices are steady.

PIPE PRICES, PAGE 716 AND 750

Pittsburgh, March 16.—An order for between 45,000 and 50,000 tons of 22-inch line pipe involved in 178 miles for the Standard Oil Co. of New Jersey, coming to a large local interest is the feature of this week's tubular products market. Other line pipe projects are up for consideration in various parts of the country, chiefly the West and Southwest, from which direction considerable jobber business is developing in miscellaneous orders for stock. A few sales are being made to oil companies having material shipped direct to locations where they are drilling wells. Standard full weight merchant pipe orders are increasing as jobbers getting ready for spring building programs find their stocks need replenishment. Operation is 85 per cent of capacity, and prices are firm.

New York, March 16.—Sellers of cast pipe continue in a strong position, being booked up from two to three months on the general run of small pipe. While both municipal and private buying the past week has been somewhat lighter, considerable work is in sight. One of the largest awards reported involves 5300 tons for a municipality in Colombia, placed with French makers.

Chicago, March 16.—Cast iron pipe demand has expanded considerably, especially in the Chicago suburban area, the past few days. More business has been taken so far this year than in the same period of 1925 and more work is pending. Detroit, the largest individual buyer last year, and its immediate suburban territory are showing signs of awakening. Chicago is expected to place 15,000 tons of small pipe this year. Zion, Ill., is expected in the market shortly for a good tonnage. With most makers bookings approximate shipments. At Duluth and Mishawaka, Ind., recently the low bidder quoted $41.60, Birmingham, and the market on cast pipe 6-inch and over seems unchanged at $41 to $42, Birmingham, or $49.20 to $50.20, Chicago. Four-inch pipe is quoted at $53.20 to $54.20, Chicago. The market as a whole displays a tendency towards strength.

Birmingham, Ala., March 15.—Increased production of cast iron pipe in this district is contemplated. Pressure pipe makers are sounding out the iron market in anticipation of steady business beyond the second quarter. Pressure pipe stacks are low and shipments have equaled the make. Prices continue steady at $40 to $41, Birmingham on 6-inch and over.

CONTRACTS PLACED

5850 tons, 4 to 24-inch class B pipe, Portland, Oreg.; to United States Cast Iron Pipe & Foundry Co.

5300 tons, municipality in Colombia, S. A., to B. Nicoll & Co., representing French makers.

3610 tons, 4 to 24-inch, De Lavaud and class B pipe, Laguna Beach, Calif., to United States Cast Iron Pipe & Foundry Co.

2200 tons, Partridge, Ill., to Lynchburg Foundry Co.

700 tons, water pipe, mostly 20-inch size, Middletown, Conn., to Donaldson Iron Co.

1000 tons, Youngstown, O., divided between National Cast Iron Pipe Co. and United States Cast Iron Pipe & Foundry Co.

400 tons, Evansville, Ind., to National Cast Iron Pipe Co.

200 tons, Morristown, N. J., to B. Nicoll & Co., representing French makers.

140 tons, Fort Dodge, Iowa, to National Cast Iron Pipe Co.

CONTRACTS PENDING

25,000 tons, San Diego, Calif.; inquiry reported out.
3500 tons, 6 to 24-inch cast pipe for White Plains, N. Y.; bids open March 22.
2280 tons, 36, 48 and 54-inch straight pipe, 95 tons of lugged pipe and 72 tons of special castings for the municipal waterworks department, Milwaukee; bids in March 23.
2200 tons, Park Ridge, Ill.; bids in.
2000 tons, Duluth; James B. Clow & Sons low bidder.
1000 tons, Akron, O.; bids in March 23.
1000 tons, Milwaukee; bids in March 22.
775 tons, Springfield, Ill.; bids in March 22.
550 tons, Mishawaka, Ind.; James B. Clow & Sons, low bidder.
500 tons, chiefly 12-inch water pipe, department of water supply, gas and electricity, New York; Dragonetti Co., low on general contract for furnishing and laying the pipe.
500 tons, Chicago board of local improvement; bids in.
400 tons, Whitefish Bay, Wis.; bids in.
400 tons, Warren, Mich.; bids in.
400 tons, Lake Bluff, Ill.; bids in.
275 tons, Manitowoc, Wis.; pending.
250 tons, Fort Wayne, Ind.; bids in.
250 tons, Toledo, O.; bids in March 23.
242 tons, 4 and 6-inch class B pipe, San Diego, Calif.; bids in March 29.
200 tons, Marshfield, Wis.; pending.
200 tons, Barrington, Ill.; bids in.
155 tons, Ohiowa, Nebr.; bids shortly.
150 tons, Wilsonville, Ill.; bids shortly.
140 tons, Lancaster, O.; bids in March 25.
Tonnage unstated, 24-inch cast iron force main and submerged outflow sewer for Gloucester, Mass.; Fay, Spofford & Thorndike, Boston, engineers, preparing plans.

Bolts, Nuts, Rivets

Second Quarter Bookings Are At Unchanged Prices

NUT AND BOLT PRICES, PAGE 716

Chicago, March 16.—For one reason because the heaviest run in the implement industry will be over, specifications for bolts and nuts in second quarter promise to be slightly under first quarter. Specifications have shown a slight downward tendency since the opening of March but most mills have good backlogs and operations are 70 to 75 per cent. Second quarter contracts are now being solicited on the basis of first quarter prices. Consumers and jobbers seem pleased with the continuity in price and are contracting for substantially the same tonnage as in the first quarter.

Pittsburgh, March 16.—Second quarter contracts are being signed on nuts and bolts as well as rivets, at first quarter prices. Operations are unchanged among the nut and bolt manufacturers, averaging about 70 per cent. Rivet makers that are active average between 50 and 60 per cent.

Cleveland, March 16.—Bolt and nut makers are just beginning to book second quarter contracts but so far few have been signed. With the price situation firm and demand continuing in good volume the market continues fairly well stabilized. First quarter quotations are being continued into the second quarter. Rivet makers will not open second quarter books for several days. Structural rivets are slow at 2.60c, base Pittsburgh, which is being adhered to by the leading interest although smaller makers are reported to be offering concessions of $1 or $2 a ton.

Bars

Sales Are Heavy and Deliveries Are Much Deferred—Prices Are Holding Steady

BUYING of steel bars is increasing after a slight lull. Consumers seem to be contracting more to cover actual needs than for stock. Makers find deliveries cannot be improved but are seeking to book as much as they can where they can meet needs of users. Production is practically at capacity. Deliveries on some sizes are eight weeks deferred.

BAR PRICES, PAGE 716

Chicago, March 16.—Last week's sales of soft steel bars were the heaviest in four weeks and represented expanding consumption rather than additions to reserves. Specifications for all finished steel with one maker last week were the heaviest in 14 weeks but bars played a relatively smaller part than shapes and plates. Automobiles and parts manufacturers, in particular, are active and the larger makers have never had heavier March schedules. Bolt and nut makers are taking out a big tonnage. Implement makers, while ending their initial spring run, are seasonably at the highest rate in five years. Pittsburgh district competition is less severe. The market on soft steel bars is 2.10c, Chicago.

Bar iron and rail steel are unchanged at 2.00c, Chicago. Seasonal business in rail steel holds up well. Bar iron schedules are a week-to-week proposition.

Boston, March 16.—Bar sales continue to increase at Boston although prices lack former strength. Sales below 2.00c, Pittsburgh, are being made by small eastern mills, but 2.00c, Pittsburgh, is freely quoted.

Philadelphia, March 16.—Buying of soft steel bars is somewhat less in volume than shipments but mills still are unable to make prompt deliveries. The price is firm at 2.00c, Pittsburgh.

Buffalo, March 15.—Bar demand is about of recent proportions. Large consumers are buying carefully, the price situation encouraging such a policy. Buffalo sellers quote bars at 2.265c.

Pittsburgh, March 16.—Merchant steel bars continue to occupy the most enviable position among steel products since barmakers are operating at 100 per cent. Makers are competing to corral all business offered by granting satisfactory delivery dates. Since on some sizes deliveries are eight weeks deferred, this sometimes is difficult. Various consuming lines are active and automotive tonnage is growing. Booking of second quarter contracts proceeds actively at 2.00c to 2.10c, the latter figure on small lots.

Refined iron bar makers also are busy. Orders are more plentiful and prices range from 3.00c to 4.50c.

Cleveland, March 16.—Tonnage keeps coming to the mills at a good rate. Although there is not a large activity in covering for definite second quarter requirements, new business is considerable. Some sellers have entered tonnage so far in March in excess of the corresponding period in February and January. Prices are well established at 2.19c, Cleveland, or 2.00c, Pittsburgh, on carloads or more while occasionally 2.10c, Pittsburgh on small lots is obtained.

Hoops and Bands

Automotive Users Lead In Demand—Booking for Second Quarter

HOOP PRICES, PAGE 716

Pittsburgh, March 16.—Led by automotive demand, hoop and band orders are increasing slightly. Narrow mills of the hot flat makers all are busy almost to capacity. The price is firm at 2.50c, and second quarter contracts already are on the books with tonnages comparing favorably with shipments of first quarter.

Cold Finished Steel

New Extra on Small Lot Shipments Is Being Applied

Pittsburgh, March 16.—With cold bar finishers opening their books for second quarter at an unchanged price, 2.50c, they are inaugurating a new extra of $2 per ton. This extra applies on shipments (not orders) less than 24,000 pounds and is in reality a handling charge for small lots of this character. Already a number of contracts have been booked, but in some cases the carry-over into second quarter will be somewhat heavier than it was for the first quarter, so that tonnages may not be quite as large. The market never was firmer as to price, and specifications last week were better than the two or three weeks preceding. Automotive business is better and other consuming lines are active. Operations vary between 75 and 80 per cent, one or two makers being on at 85 per cent.

Automatic tinning equipment of the Poole and Davis type will be installed in the tin houses of the Trumbull Steel Co., Warren, O. Contracts for the units recently were placed with the Aetna Foundry & Machine Co., Warren, O.

Structural Shapes

New Work More Plentiful but Action on Large Projects Continues Deferred—Prices Stiffen for Second Quarter

INQUIRIES for structural shape tonnages are more numerous. Although somewhat under the seasonal level, greatly increased activity is expected with advent of better weather. Awards have dropped from the high level of last week, although lettings are above the rate for the first two months of this year. Another Union terminal unit at Cleveland will take 20,000 tons. Two proposed bridges in New York will require 35,000 tons. Commercial work will require 65,000 tons. About 200,000 tons is being figured definitely.

Prices are stiffening up for second quarter as mills become better booked. Fabricated and erected prices are subject to keen competition, unusually low prices having been developed recently on attractive tonnages.

STRUCTURAL SHAPE PRICES, PAGE 716

New York, March 16.—Structural activity is less brisk, but still involves some substantial tonnages, including 3000 tons awarded for a loft in West Thirtieth street. A good volume of business is in prospect. It is estimated that steel for the work filed in the Metropolitan district, but not yet placed, aggregates approximately 65,000 tons. This does not include 35,000 tons which is estimated needs for two bridges over Kill Van Kull, and involves only commercial building work. In addition, a large amount of work is still on architects' boards. Hesitancy is still manifested among builders, pending a fuller adjustment of wage schedules in the building trades. So far, a definite agreement has been made in six trades, but negotiations are still being carried on by a number of others, including plasterers and bricklayers. Among larger tonnages contemplated are 8000 tons for a state bridge at Bath, Me., and approximately 11,000 tons for the Salmon building in West Forty-second street. On this latter project, the builder is understood now to be endeavoring to obtain bids on the pound price basis.

Boston, March 16.—More new work is in sight at Boston although awards of the past week have been few. It is reported plans will be out in April covering 8000 tons for a bridge at Bath, Me. Prices are steady.

Philadelphia, March 16.—The structural market continues to reflect firmness in prices with a range of 1.85c to 2.00c Pittsburgh prevailing, depending upon circumstances. The 1.85c price appears a firm minimum. Deliveries are stretching out somewhat further.

Pittsburgh, March 16.—A large number of small industrial building programs are developing as spring advances. Most of these are for repairs or alterations and rarely exceed 25 or 50 tons of structural steel each. Inquiry is good and prospects are bright for heavy buying. Large awards are not numerous. From 1.90c to 2.00c represents the range of quotations on plain material but competition remains keen on material fabricated and erected.

Chicago, March 16.—Fabricators' stocks of beams are unusually low for mid-March and the mills are being pressed for deliveries. Structural awards are light this week, following the record breaking tonnage last week, but pending work is expanding as more favorable building weather approaches. The 3500-ton University of Chicago stadium, upon which the American Bridge Co. was low bidder, is being refigured to decrease the structural and increase the reinforcing bar tonnage. The 6500-ton Harmon sports arena awaits financing. Structural mills are on the best schedules in several months. Beams are quoted at 2.10c, Chicago.

Cleveland, March 16.—Dullness continues unbroken in the local structural market. The expected increase in buying following award of the union terminals tonnage has not materialized. Small lots are numerous. Plain material prices are firm at 2.09c to 2.19c Cleveland or 1.90c to 2.00c Pittsburgh. Another Union terminal unit will require about 20,000 tons.

Awards Compared

	Tons
Awards this week	22,615
Awards last week	55,933
Awards two weeks ago	43,960
Awards this week in 1925	18,117
Average weekly awards, Feb.	25,203
Average weekly awards, 1926.	28,670
Total awards to date, 1925	380,748
Total awards to date, 1926	309,331

CONTRACTS PLACED

3000 tons, approximately, 20-story loft building, West Thirtieth street, New York, to the Hedden Iron Construction Co.

2400 tons, Fox theater, Market and Larkin streets, San Francisco, to Dyer Bros. Golden West Iron Works.

2150 tons, Macy store and theater building, Atlanta, Ga., to Austin Bros. Bridge Co. through Starrett Bros., general contractors.

1000 tons, approximately, 16-story loft, West Thirty-fifth street, New York, to Post & McCord.

1000 tons, state war memorial at Indianapolis, to Insley Mfg. Co.

950 tons, Lackawanna railroad bridges, to American Bridge Co.

800 tons, building for the American Sugar Refining Co., New York, to the Jones & Laughlin Steel Corp.

800 tons, Beaux Arts building, Los Angeles, to Llewellyn Iron Works.

765 tons, Electric Auto Light Co. plant, Toledo, O., to Massillon Bridge & Structural Co., reported last week awarded unnamed fabricator.

725 tons, Fitch garage, Youngstown, O., to the McClintic-Marshall Co.

725 tons, addition to Milwaukee Central Continuation school, to Worden-Allen Co.

695 tons, power house for Wisconsin Public Service Co. at Green Bay, Wis., to Lakeside Bridge & Steel Co.

675 tons, hotel annex, Long Beach, Long Island, N. Y., to the Owego Bridge & Iron Co.

500 tons, Hale Bros. building, San Francisco, to Western Iron Works, San Francisco.

500 tons, Hudson county jail, Jersey City, N. J., to the Selbach-Meyer Co.

450 tons, building for John Waster, Philadelphia, to the Fort Pitt Bridge Works.

450 tons, Jeans hospital, Philadelphia, to McClintic-Marshall Co.

450 tons, hotel for the Webster Hall Corp., Pittsburgh, to the Pittsburgh-Des Moines Steel Co.

400 tons, steam laundry building at Memphis, Tenn., to Pidgeon-Thomas Iron Co.

400 tons, Pennsylvania railroad bridge in Ohio, to the McClintic-Marshall Co.

350 tons, Interstate bridge, South Carolina and Georgia, to unnamed fabricator.

350 tons, theater, Hartford, Conn., to Belmont Iron Works.

500 tons, telephone building, Pasadena, Calif., to unstated Pacific Coast fabricator.

500 tons, theater, San Diego, Calif., to unstated Pacific Coast fabricator.

300 tons, theater, San Jose, Calif., to Golden Gate Iron Works.

300 tons, platform extensions for the Brooklyn-Manhattan Transit Co., Brooklyn, N. Y., to the Fort Pitt Bridge Works.

290 tons, Masonic Temple, New Haven, Conn., to Berlin Construction Co.

250 tons, United States reclamation dam in Wyoming, to Lakeside Bridge & Steel Co.

200 tons, apartment, Hyde street, San Francisco, to Central Iron Works.

200 tons, bridge for the Lehigh Valley railroad to an unnamed fabricator.

200 tons, miscellaneous work, including the Ford garage at Monongahela City, Pa., to the Guibert Steel Co.

175 tons, transmission towers for the Alabama Power Co., to the American Bridge Co.

150 tons, grandstand, agricultural park, Sacramento, Calif., to Golden Gate Iron Works.

150 tons, miscellaneous work including building for the Sherrod association, Pittsburgh, to the W. N. Kratzer Co.

140 tons, East River Savings Bank, 743 Amsterdam avenue, New York, to Bethlehem Fabricators, Inc.

110 tons, bridge for Michigan state highway department, Bancroft, Mich., to American Bridge Co.

100 tons, garage, Watertown, Mass., to Palmer Steel Co.

100 tons, building for the McKeesport Tin Plate Co., McKeesport, Pa., to the Jones & Laughlin Steel Corp.

200 tons, following projects: Telephone exchange, Nyack, N. Y., to Eidlitz & Ross; repairs to Hellgate electric station, New York, to Post & McCord.

Unnamed tonnage, S. S. Kresge Co. store building, Perth Amboy, N. J., to Hoefner Co.

CONTRACTS PENDING

35,000 tons, two bridges over Kill Van Kull, for port of New York authorities; W. A. L. Waddell, 150 Broadway, New York, consulting engineer.

20,000 tons, approximately, additional unit for

Union terminals project, Cleveland; plans expected out shortly.
12,000 tons, span for Mid-Hudson bridge, Poughkeepsie, N. Y.; to come out later.
11,000 tons, Salmon office building, West Forty-second street, New York; contemplated.
8000 tons, bridge at Bath, Me.; plans reported ready in April.
2500 tons, Keith theater building, Boston; pending.
2000 tons, Boston Gas Co. building, Boston; pending.
1500 tons, General Forbes hotel addition, Pittsburgh; financing delayed.
1500 tons, Stone & Webster Co. building, Boston; pending.
1000 tons, Weiner apartment building, Boston; pending.
1000 tons, piers for Mid-Hudson bridge, Poughkeepsie, N. Y.; pending.
835 tons, various highway bridges in Illinois; bids in March 31, by public works department, division of highways, Springfield, Ill.
650 tons, state highway bridge, Camden, N. J.; bids asked.
450 tons, bridge alterations for the New York Central; pending.
450 tons, Masonic temple, Clinton, N. J.; pending.
400 tons, Lutheran church in Minneapolis; pending.
400 tons, school, Crockett, Calif.; pending.
400 tons, factory for Foxboro Co., Foxboro, Mass.; pending.
400 tons, highway bridge, Tampa, Fla.; pending.
300 tons, Monongahela Trust Co. bank building, Homestead, Pa.; bids being taken.
300 tons, theater at Parkersburg, W. Va.; bids in.
250 tons, First Presbyterian church, Berwick, Pa.; bids close March 20.
250 tons, hotel building and alterations, Morgantown, W. Va.; bids close March 25.
200 tons, Masonic temple, Tacoma, Wash.; general contract awarded.
200 tons, Bay Ridge Savings bank, Brooklyn, N. Y.; pending.
200 tons, Edgemont school, Montclair, N. J.; pending.
200 tons, building for the Firestone Tire & Rubber Co. at Hudson, Mass.; bids asked.
175 tons, Tremont street bridge, Boston, bids in.
150 tons, high school, Walpole, Mass.; bids in.
100 tons, filtration plant, Wenatchee, Wash.; bids in.
100 tons, two span steel bridge across little Pilchuck river, Oregon; general contract awarded Dischaw & Peterson.
Unstated tonnage, bridge across Ohio river at Rochester and Monaca, Pa.; Federal engineers shortly to ask for bids.
Unstated tonnage, three theaters for Marcus Loew, Inc., downtown Pittsburgh, Squirrel Hill and East Liberty; bids about to be asked.
Tonnage unstated, University of Chicago stadium, Chicago. Original plans, requiring 3500 tons, being refigured and new bids taken this week. Holabird & Roche, 104 South Michigan avenue, Chicago, architects.
Unnamed tonnage, carshop extensions for Otis Elevator Co., Harrison, N. J.; pending.

Stoker Sales Increase

Washington, March 16.—Mechanical stoker sales in February totaled 83, an increase of 11 over January, according to reports from 13 manufacturers to the department of commerce. Further comparisons follow:

	Stokers sold	Fire tube boilers	Water tube boilers
1923 Total	1,464	177	1,287
1924 Total	1,128	161	967
1925 Total	1,348	263	1,085
January	57	4	58
February	135	28	107
March	131	17	114
April	120	23	97
May	122	23	99
June	128	26	102
July	147	30	117
August	91	27	64
September	119	34	85
October	114	22	92
November	76	8	68
December	108	21	87
January, 1926	72	10	62
February	83	12	71

Concrete Bars

Activity Expanding Slowly as Weather Continues Handicap—Prices Held Steady

SLOWNESS of weather to develop into suitable building conditions continues to dull demand for concrete bars. Considerable construction and roadbuilding activity hinges on the advent of spring. Awards and inquiries involve small tonnages. A small tonnage of foreign bars has been taken at 2.00c, cars Boston. Domestic prices are unchanged.

REINFORCING BAR PRICES, PAGE 716

Chicago, March 16.—Pending work in reinforcing bars is expanding slightly each week but awards continue unseasonably low. Rail steel as well as billet bar work is slow in going ahead. Probably 4000 tons of bars are required for pending jobs. Billet bars are quoted at 2.60c, Chicago warehouse, and rail steel at 2.00c.

Boston, March 16.—General sales of concrete bars at Boston have improved during the week although large awards are few. Foreign bars have been offered the trade at 2.00c on cars Boston and at 2.10c on cars Providence. A moderate tonnage is reported placed at these figures.

Buffalo, March 16.—Inquiry for reinforcing bars is improving as building projects approach definite action. Two new cement plants, an elevator addition and several school jobs, aggregating more than 2500 tons will be placed in the near future. Other smaller tonnage is pending. The price is steady at 2.265c for lots from mills and 2.75c for stock shipment tonnage.

Pittsburgh, March 16.—Postponed action largely is true concerning the bigger projects here involving the use of concrete bars. A large number of orders involving 10 or 15 tons at a time find their way to makers' books each week. The mill price is 2.00c to 2.10c, and the warehouse figure is 2.60c on new billet bars.

Cleveland, March 16.—Bookings of concrete reinforcing bars in this district during the past several weeks have been unusually light. One maker selling in this territory booked less than 100 tons last week. Jobbers are cutting quotations to move stocks, eliminating mill competition. Inquiry is increasing but involves mostly small lots. New billet bars are firm at 2.19c to 2.30c Cleveland, no tonnage of size testing the strength of the minimum. Rail steel is steady at 1.80c to 1.90c.

Awards Compared

	Tons
Awards this week	3,875
Awards last week	2,975
Awards two weeks ago	8,690
Awards this week in 1925	15,762
Average weekly awards, Feb.	4,109
Average weekly awards, 1926	4,547
Total awards to date, 1925	74,937
Total awards to date, 1926	49,343

CONTRACTS PLACED

1000 tons, Gimbel Bros. store at Philadelphia, to Truscon Steel Co.
650 tons, Coney Island repair shops, New York, to Concrete Steel Co.
500 tons, Pennsylvania state highway work to different makers such as Kalman Steel Co., Concrete Steel Co., and the Fort Pitt Bridge Works.
400 tons, in addition to 500 tons previously reported for Sixtieth street sewer, Brooklyn, N. Y., to a European mill through P. J. Carlin Construction Co.
350 tons, plant for Robert Gair & Co., Piermont, N. Y., to Donner Steel Co.
325 tons, subway for Chicago & Western Indiana railroad, in Chicago, to Truscon Steel Co. Underground Construction Co., 130 North Wells street, Chicago, contractor.
280 tons, Brainard Printing Co. building, Hartford, Conn., to Truscon Steel Co.
150 tons, University of Iowa heating plant, Iowa City, Iowa, to Des Moines Steel Co.
120 tons, Gray-Mayer memorial library, Northwestern university, Chicago, to Truscon Steel Co. J. B. French Co., 30 North Michigan avenue, Chicago, contractor.
100 tons, Merchants' National bank building, Michigan City, Ind., to Olney J. Dean & Co.

CONTRACTS PENDING

2000 tons, sea wall, Maracaibo, Venezuela; pending.
1600 tons, Pennsylvania state highway road work; lettings to take place shortly.
600 tons, Illinois bridge and highway work; bids in March 31, by public works department, division of highways, Springfield, Ill.
385 tons, engineering department, Minneapolis; pending.
150 tons, University of Chicago Stadium, Chicago; plans being refigured by Holabird & Roche, 104 South Michigan avenue, Chicago, and tonnage will be increased.
100 tons, building for the H. J. Heinz Co., Pittsburgh; bids being considered.
Tonnage unstated, 16-story apartment hotel in Waldon place near Dearborn street, Chicago; Samuel Cole, 307 North Michigan avenue, Chicago, owner and B. Leo Steif, same address, architect.
Tonnage unstated, 14-story apartment at 102 Chestnut street, Chicago; Olsen & Urbain, 155 North Clark street, Chicago, architect.
Tonnage unstated, 13-story hotel, Chicago, for Davis Hotel Co., 827 Wilson avenue, Chicago; Russman & Hirschfeld, 64 West Randolph street, Chicago, architects.

"Etching Solutions for Nonferrous Metals" are covered in the most recent data sheets issued by the American Society for Steel Treating. Although abstracted from various sources, the information is most complete. The nonferrous metals discussed are: Copper; brasses; copper-aluminum alloys; German silver; nickel, monel metal, etc.; aluminum and light aluminum alloys; lead, tin and their alloys; zinc and alloys rich in zinc.

Rails, Cars

Western Carbuilders' Backlogs Diminish—Several Buying Programs Planned

CARBUILDERS in the Chicago district specified 50,000 tons of steel from mills last week and have a like amount yet to place. Delivery pressure has raised Chicago rail mills to highest schedules in their history. Track fastenings are active. Boston & Maine has purchased some German rails against its 16,000-ton inquiry.

RAILROAD TRACK MATERIAL PRICES, PAGE 716

Chicago, March 16.—Chicago district car builders can operate at their present rate, which is better than 75 per cent, until the middle of August, but considering the time necessary to assemble materials this comparatively narrow margin is unsatisfactory. These car builders last week specified about 50,000 tons of car steel and have that much more to place. Last week's car orders, including 1850 by the Southern railway and 200 by the Illinois Central to western makers, call for 20,000 tons of steel not included in the above figures.

Pressure for rails has forced Chicago district rail mills to the highest schedules in their history. Recent track fastening orders include 5000 kegs of spikes and bolts and 3500 tons of angle bars. Tie plates business is light. Demand for pressed wheels continues heavy.

Boston, March 16.—Boston & Maine railroad has purchased at least part of the 16,000 tons of standard tee rail required for its 1926 construction in Germany, according to Homer Loring, chairman of that road's trustees. A. W. Munster, chief purchasing agent of the Boston & Maine system, has been in Germany for some time past studying prices and quality of German rails. The German quotations are understood to be considerably lower than the domestic price.

New York, March 16.—The eastern car market is featured by an inquiry for 1000 box cars for the Central of New Jersey. Inquiries and awards are fairly numerous. Locomotive demand includes an inquiry for 25 locomotives for the Delaware, Lackawanna & Western. New York board of transportation opens bids March 19 on 3400 gross tons of rails.

Purchase by the Henry Ford interests and the Boston & Maine railroad of European rails has aroused considerable comment here. It is stated that American makers have been quoting around $40 a gross ton, c.i.f. Japan, on recent Japanese rail orders, and that the equivalent prices would more than meet European competition in this country.

Philadelphia, March 16.—Heavy railroad buying is indicated by A. T. Dice, of the Reading railroad, which has announced a $30,000,000 program including grade crossing work, two ferry boats and other numerous improvements. Philadelphia Rapid Transit is expected to inquire for girder rails.

Pittsburgh, March 16.—Tonnage is slightly more satisfactory in light rails but prices still are low. From $35 to $36 is being named and since billets are $35 it is claimed there is not enough margin.

Track accessory demand is confined to small lots. One or two large inquiries are understood to be in course of preparation. Prices are unchanged.

ORDERS PLACED

Central of Georgia, 6 coaches and 3 diners to Pullman Car & Mfg. Corp.; 5 baggage cars to American Car & Foundry Co.
Chicago, Burlington & Quincy, 100 ballast cars, to American Car & Foundry Co.
Chicago North Western, 250 ballast cars, to the American Car & Foundry Co., 250 underframes, to the Western Steel Car Co., and 250 underframes, to the Ryan Car Co.
Delaware, Lackawanna & Western, 40 milk cars, to the Standard Steel Car Co.
Florida East Coast, 40 caboose cars, to the Mt. Vernon Car Mfg. Co.
Illinois Central, 200 automobile furniture cars, to Pullman Car & Mfg. Corp.
Imperial Refining Co., 100 tank cars, to Pennsylvania Tank Car Co.; 40 air dump cars to the Magor Car Corp.
Independent Oil & Refining Co., 50 tank cars, to the Pennsylvania Car Co.
Litchfiield & Madison, 200 hopper car bodies, to the Ryan Car Co.
Missouri Pacific, 600 box car bodies, to Pennsylvania Tank Car Co.
Northern Pacific, 220 underframes, to the Siems-Stembel Co. division of Standard Steel Car Co.
Oliver Iron Mining Co., 40 air dump cars, to the Magor Car Corp..
Roxana Petroleum Co., 401 tank cars, to the American Car & Foundry Co.
Southern railway, 500 box cars to own shops. This reduces order reported to Mt. Vernon Car Mfg. Co. from 1600 to 1100.
Wichita Falls & Southern, 50 box cars, to the American Car & Foundry Co.

LOCOMOTIVE ORDERS PLACED

Chicago, Rock Island & Pacific, 15 locomotives, to the American Locomotive Co.
Long View, Portland & Northern, two locomotives, to the American Locomotive Co.
Standard Slag Co., switch engine, to the American Locomotive Co.
Tennessee Coal, Iron & Railroad Co., switch engines, to the American Locomotive Co.

ORDERS PENDING

Boston & Maine, 25 motor coaches; bids being taken.
Canadian National, 50 express refrigerator cars, and 40 additional tank cars; pending.
Central Railroad of New Jersey, 1000 box cars; pending.
Detroit Municipality, 100 street cars; bids open shortly.
Lake Engineering Corp., Buffalo, one scale test car; pending.
New York Rapid Transit Co., 11 freight cars; bids open shortly.
North American Car Co., 500 tank cars; pending.
Pere Marquette, 10 air dump cars; pending.

LOCOMOTIVES PENDING

Delaware, Lackawanna & Western railroad, 15 Mikado and 10 mountain type locomotives; bids being taken.
Great Northern railroad, diesel electric locomotives valued at $100,000, pending.

Wire

Some Improvement Shown in Backward Season, With Buyers' Stocks Low

SEASONAL conditions, always affecting wire and its products, have delayed spring buying in the West but manufacturers are taking large tonnages. Jobbers and mills alike are adverse to accumulating stocks and this is a feature of strength in the situation. Mill operations are steady and prices are firm in all centers. Fence demand is increasing.

WIRE PRICES, PAGE 716

Pittsburgh, March 16.—While one or two makers report that they have not shared in it noticeably, other wire products makers state that they have experienced an increase in mixed carload business. Several also note a larger number of straight carload orders for nails and with the season for fencing getting well under way. As yet operations average 70 per cent. The base prices are not being deviated from 2.50c on plain wire and 2.65c on wire nails being universally held.

Boston, March 16.—Demand for wire and wire nails lacks the vigor apparent a week ago. Prices are firm at 2.65c Pittsburgh for wire nails and 2.65c Worcester for plain wire.

Buffalo, March 16.—Wire demand has improved. Jobbers are taking liberal shipments and manufacturers are making second quarter purchases.

Chicago, March 16.—Jobbers' orders and stocks of wire and nails are light considering the proximity of spring rural buying. Mills seem no more willing than jobbers to pile stock in anticipation of rising spring demand and accumulations at the mills are at the lowest point of this quarter. Jobbers report exceptionally adverse road and weather conditions for March in the Central West. Manufacturing lines are moving good, the railroads and automobiles manufacturers specifying heavily. Plain wire is held at 2.55c, Chicago or western mill, and wire nails at 2.70c. Mills regard low stocks all around as a strong factor.

Nonferrous Metals

Prices Ease Off on Most Metals With Buying Light—Shipments Continue Heavy and Outlook Still Good

Prices of the Week, Cents a Pound

	Copper—Electro delivered	Copper—Lake delivered	Copper—Casting refinery	Spot Straits Tin, N. Y.	Lead New York	Lead East St. Louis	Zinc St. Louis	98-99% Aluminum	Spot Antimony	Ingot Nickel
Mar. 10	14.20	14.37½	13.55	64.50	8.40	8.25	7.35	27.00	19.00	35.00
Mar. 11	14.20	14.37½	13.55	65.50	8.40	8.05	7.30	27.00	18.50	35.00
Mar. 12	14.20	14.37½	13.55	65.25	8.20	8.00	7.27½	27.00	18.25	35.00
Mar. 15	14.15	14.30	13.50	65.25	8.20	8.00	7.30	27.00	18.00	35.00
Mar. 16	14.15	14.30	13.50	65.50	8.20	8.00	7.30	27.00	18.50	35.00

NEW YORK, March 16.—Prices of nonferrous metals have eased a little the past week and then some have become firmer. Buying has been light but shipments in most instances have continued large. Producers' stocks have increased, as shown in the copper and zinc statements the past week, but they are not excessive, especially in view of the fact that consumption apparently is running greater than it was a year ago.

Most business indicators point to good activity in the metals over the next few months. The stock market has been a factor to retard buying and the London metal market for a while interpreted the stock market break here as adverse to metal business, but it is believed that any probable slump in business has been discounted and that lower metal prices now put the market on a sound basis. Export business is lacking and with the muddle abroad the outlook is cloudy.

Copper—Stocks of refined metal held by producers increased nearly 5000 tons last month, as output again was a little larger than shipments. However, domestic shipments were larger than in January and near the same high daily rate as in other recent months. Output of copper on a daily basis increased slightly last month. Exports remain light compared with last year but it is said in the market that any recovery in this direction would be quickly reflected in the strength of the market, as stocks still are much lighter than a month's shipments. In the past week electrolytic copper has been mostly about 14.20c delivered Connecticut, but some metal could be obtained 5 points or more lower.

Zinc—After the February statement on supplies showed a weak situation, the market slumped further, so that on Saturday a little prime western sold as low as 7.25c East St. Louis, but then the market became firmer and nothing could be bought under 7.30c, with some smelters asking higher. Stocks at the end of February were 20,341 tons, an increase of 6041 in the month and more than twice as large as at the beginning of the year.

Tin—The plating metal went to the highest price since 1919 the past week, much metal being sold at 65.00c or higher. Top-notch sales were mostly small lots but buying was big for March, April and May and some of this business was at or near 65.00c. Use continues big and supplies are unusually limited. Demand is mostly for early positions and futures are more than 2.00c under spot.

Lead—Prices fell rapidly with slack buying and plentiful supplies but when the St. Louis market stuck at 8.00c even though the differential under New York was thereby narrowed again as the latter was cut to 8.20c, signs of firmness reappeared.

Substantial Price Cut Made On Sheet Zinc

Chicago, March 16.—Zinc sheet prices have been cut by the leading producers about ¼-cent and in this connection the Illinois Zinc Co., Peru, Ill., has incorporated important changes in quoting. Hereafter, the company announced, the boxing charge for 500 pound boxes will be absorbed in the base price, and deductions from the base price will be allowed on sheet zinc packed in bulk or in 200, 300 and 600 pound casks. The company's price announcement follows:

Effective March 15 base price of sheet zinc in 500 pound boxes is $11.75; in 300 or 600 pound casks $11.55; in 200 pound casks $11.65; in 100 pound casks $11.75 and in bulk $11.50. Ribbon zinc in coils is $11.50 in 500 pound boxes and $11.25 in bulk. All No. 9 gage or heavier quoted f.o.b. mill.

Mill Products

Base prices cents per pound, f.o.b. mill

SHEETS	
High brass	19.12½
Copper, hot rolled	22.75
Zinc, ga. 9 to 23 (100-pound base)	11.75
Lead full sheets (cut ¼c more)	12.25 to 12.75
Aluminum, bright flat, up to 10 gage	37.50
SEAMLESS TUBES	
High brass	23.75
Copper	24.50
RODS	
High brass (round ⅝ to 2½-inch)	16.87½
Naval brass	19.62½
WIRE	
Copper	16.25
High brass	19.62½

Old Metals

Dealers' buying prices, cents per pound

HEAVY RED BRASS	
New York	8.75
Chicago	9.50
Cleveland	9.00 to 9.25
HEAVY YELLOW BRASS	
New York	7.25
Chicago	8.25
Cleveland	6.50 to 6.75
ZINC	
New York	4.25
Cleveland	4.50 to 4.75
HEAVY COPPER AND WIRE	
New York	11.75
Chicago	11.50
Cleveland	10.75 to 11.00
RED BRASS BORINGS	
New York	8.25
YELLOW BRASS TUBING	
Cleveland	6.75 to 7.00
LIGHT COPPER	
New York	9.50
Chicago	9.75
Cleveland	9.50 to 9.75
LIGHT BRASS	
Chicago	7.50
Cleveland	6.00 to 6.25
ALUMINUM	
Clippings	21.50 to 22.00
Borings, Cleveland	13.00 to 13.50
Cast	18.00 to 19.00

Secondary Metals

Remelt aluminum No. 12	24.00 to 25.00
Brass ingot	12.00 to 12.25

Coke By-Products

Sulphate Prices Lower—Distillates Fairly Active

New York, March 16.—Reflecting the approaching end of the fertilizer season, sulphate of ammonia prices have declined to a range of $2.60 to $2.70, delivered, for domestic account and $2.60 to $2.70, port, for export. Foreign trading this year has been lighter than usual, export consumers apparently holding off in anticipation of the usual slump early in the spring.

Coke Oven By-Products

Per Gallon at Producers' Plants in Tank Lots

	Spot	Contract
Pure benzol	$0.23	
90 per cent benzol	0.24	
Toluol	0.35	
Solvent naphtha	0.35	(nominal)
Commercial xylol	0.36	(nominal)
Phenol	0.22	0.22
Per Pound at Producers' Plants		
Naphthalene flakes	0.07	
Naphthalene balls	0.08	
Per 100 Pounds Delivered		
Sulphate of ammonia	$2.65	

Light oil distillates continue unchanged and in fairly active demand. Ninety per cent benzol is quoted at 24 cents works, in tanks and 29 cents, in drums; pure benzol at 23 cents, works, in tanks and 28 cents in drums; solvent naphtha and toluol, 35 cents works in tanks, and 40 cents in drums, and commercial xylol, 36 cents in tanks, and 41 cents in drums.

Coast Buys Much Pipe

Shapes and Cast Iron Pipe Only Products Selling in Quantity—Large Requirements Pending in All Lines

SAN FRANCISCO, March 13.—(*By Air Mail*)—With the exception of structural shape awards and two large cast iron pipe lettings, activity in iron and steel products is confined to small business. The price structure remains firm and the trade is encouraged over the amount of tonnage involved in new projects about to be released for figures.

Pig Iron and Coke

Consumers of pig iron and coke apparently have sufficient stocks to take care of present requirements and are entering the market only for small spot lots. Foundry activity remains quiet and little improvement in the rate of operation is noted. Prices have not changed during the past few weeks and are as follows:

Coast Pig Iron Prices

Columbia basic	$27.00 to 28.00
Columbia, No. 2 Fdry., San Francisco and Los Angeles	27.00 to 28.00
Anzan No. 1 (Chinese) 2.50 to 3.50 sil. Del. S. F.	25.50
Anzan No. 1 (Chinese) 2.50 to 3.50 sil. Del L. A.	26.00
*Dutch	24.00
*Indian iron	24.25
*Belgian	24.00
German	24.00
*English (2.75 to 3.75 sil.)	25.00 to 26.00

*C.I.F. duty paid.

Bars, Plates and Shapes

Distributors of reinforcing bars report demand quiet and bookings confined to lots of less than 100 tons. Several large tonnages are pending and a good deal of new work is in sight. Prices appear firm at 3.20c in less than carload lots and 2.95c on carload lots.

Demand for hoops and bands is fairly well maintained and mill representatives report a number of orders booked for future shipment. While 2.50c base Pittsburgh is the usual quotation, some business, due to lower water rates, has been placed at the equivalent of 2.40c base.

Prices on plate material now appear firm at 2.30c. Consumers believe 2.25c could be obtained on large, desirable lots. No awards of importance were noted this week. Pending business is in excess of 19,000 tons, the newest inquiry of the week calling for 200 tons for a pipe line at The Dalles, Ore, bids on which have been opened.

Awards of structural shapes totaled 3800 tons this week. Dyer Bros. took 2400 tons for the Fox theater in San Francisco, Llewellyn Iron Works 800 tons for the Beaux Arts building in Los Angeles and Golden Gate Iron Works 300 tons for a theater in San Jose, Calif. Pending business aggregates over 10,000 tons. New inquiries include 400 tons for a school at Crockett, Calif., and 100 tons for a filtration plant at Wenatchee, Wash. Prices continue firm at 2.35c c.i.f. Pacific Coast ports.

Other Finished Material

Only two awards of cast iron pipe were made this week but in each case the tonnage was large. The United States Cast Iron Pipe & Foundry Co. took 5850 tons for Portland, Oreg., and 3610 tons for Laguna Beach, Calif. Pending business, including 25,000 tons for the San Diego pipe line, exceeds 36,000 tons. Prices remain around $50 base delivered. M. Allen & Co. secured 382 tons of 12-inch welded pipe for Los Angeles.

Demand for wire products is fair for this time of the year. Prices on hard bright wire and nails are firmer and 3.00c c.i.f. on plain wire is now being quoted generally while nails are selling at 3.20c to jobbers and 3.25c to consumers.

Little of interest has occurred in the sheet market and buying has been confined to small lots. Prices remain firm at the present Pittsburgh base level.

Warehouse distributors in the San Francisco district have advanced price on nails and cement-coated nails $5 a ton, from 3.50c to 3.75c and from 2.75c to 3.00c, respectively. In Los Angeles territory bars have been advanced from 3.05c to 3.20c, plates from 3.15c to 3.20c, shapes from 3.05c to 3.20c, bands from 3.90c to 4.05c, nails from 3.50c to 3.65c and cement coated nails from 2.90c to 3.00c.

Northwest Holds Firm

SEATTLE, March 13.—General business conditions show improvement. While the iron and steel trade presents nothing important, prices are firm and considerable new business is in prospect.

Construction in Seattle and Portland continues brisk, new projects being announced almost daily. This week the Pacific Telephone & Telegraph Co. made known that it will proceed shortly with a 3-story addition to its main plant here at a cost of $700,000. The Public Theaters Corp., Seattle, also announced that it has completed negotiations for building a $1,250,000 theater. Both Oregon and Washington highway commissions have adopted plans for extended road work.

Pig Iron and Coke

The foundry situation has improved materially, much new work having been booked this month. Most plants are casting every day. The Alaska canneries and ship repair work account for many new jobs. While consumers are well stocked with pig iron some small orders have been placed, one concern having bought 150 tons of No. 1 Columbia at $27. Some British iron is being offered at $24.15 c.i.f. duty paid. Westphalian coke is still quoted at $14 while Tyneside is selling at $14 in less than 100 ton lots and $13.50 in larger quantities.

Bars, Plates and Shapes

While Eastern mills have raised bar prices from 2.30c to 2.35c, the local mill is still quoting 2.35c. A fair run of specifications is reported by the local plant. Considerable business has been booked but in small tonnages, mostly car lots or less. No large tonnages are pending at present but much new work is to be up for figures soon. One of the larger jobs to be awarded soon is for the new Masonic temple at Tacoma in which about 200 tons are involved. The general contract was awarded this week at $332,395. Local exporters have had an inquiry for 200 tons of bars for quick shipment to Japan but it is understood the award went to eastern manufacturers.

Plates and shapes are firm and unchanged at 2.30c and 2.35c respectively. Bids were opened yesterday at Medford, Oreg., for a pipe line job involving 3600 tons of plates, the largest contract pending in this territory. The Puget Sound Machinery Depot has been awarded the contract to build a steel standpipe and supports for the city of Seattle. This job involves about 350 tons of steel.

Demand for structural shapes is fairly good. The Hofius Steel & Equipment Co. has the contract for the structural steel, about 50 tons, for the first unit of the Northwest Rolling Mills plant, Seattle, for which the Austin Co. has the general contract. The mill, 60 x 180 feet, will be of heavy steel construction with steel sash and corrugated iron walls. Space for a 10-ton craneway will be provided. The first shipment received at the new Kelso, Wash., docks was 400 tons of steel for the Weyerhaeuser company's Cowlitz river bridge. Dischaw & Peterson, Stanwood, have the contract for a steel span over the Little Pilchuck river, involving about 100 tons. No large contracts are pending in this district at present.

Finished Materials

Jobbers report a fair turnover with prices unchanged. There is little price cutting in the Seattle territory although conditions continue unsettled at Portland, due to larger imports of steel and keener competition. Business here is confined to small tonnages but the aggregate is satisfactory.

British Steel Demand Heavier

Sales More Active, and February Output Shows Substantial Increase—Pig Iron Quiet, Due to Coal Dispute—German Competition Reasserting Itself —Saar Mills Book 5000 Tons of Rails for Mexico

2-3 Caxton House, Westminster, S. W.1
European Headquarters,
IRON TRADE REVIEW,

LONDON, March 16.—(*By Cable*)—The principal effect of the unsettled labor situation is noted in the pig iron market, which is inactive. Buyers and sellers are not inclined to commit themselves until there are more favorable developments in the coal dispute. Some good sales of semifinished steel are reported this week, and inquiries for steel are increasing. German competition is reappearing, German mills offering steel bars at £6 7s 6d ($30.98), delivered. Demand for galvanized sheets from South America and India is brisk.

Production of pig iron in Great Britain in February was 502,000 tons, compared with 533,500 tons in January and a monthly average of 519,683 tons in 1925. Steel output in February totaled 703,800 tons, compared with 635,700 tons in January and a monthly average of 616,441 tons in 1925.

British iron and steel exports in February amounted to 339,474 tons. The January total was 336,664 tons, and the monthly average for 1925 was 311,221 tons. Iron and steel imports last month were 228,538 tons, compared with 221,663 tons in January and the monthly average of 234,834 tons in 1925.

An IRON TRADE REVIEW dispatch from Paris states French export business is quiet. Mill interests in the Saar have booked 5000 tons of rails for Mexico and 3000 for France. Brussels reports German competition inceasing ,while a message from Berlin says German exports are increasing, with good sales of plates to Japan and England.

British Market Slackness Considered Lull

Office of IRON TRADE REVIEW,
Prince's Chambers, Corporation St.

BIRMINGHAM, Eng., March 7.—(*European Staff Service*)—The prevailing slackness is generally described as a lull, not to be taken too seriously. But, for the present, it affects nearly all departments. The shadow of coal difficulties still overhangs industry, despite optimistic forecasts of a peaceful settlement emanating even from the labor side. Contracting beyond April is not considered. The pressure for East Coast hematite iron has gone off, with the result that much material can be promptly supplied, and prices have eased slightly. No. 3 G. M. B. is still maintained at £3 10s ($17.01), possibly because exports have improved, following firmer Continental prices.

Sterling $4.86

Owners of furnaces are commending their own judgment in declining to restart further plant and it is unlikely the number of operating furnaces will be increased for some time. Steel demand is far below requirements of mills. Shipbuilding orders have so far not made any appreciable addition to plate mill operation. Dorman, Long & Co. have secured an order for 100,000 steel ties for the Egyptian State railways. That firm is well in the running in home and foreign competition. The steel business is chiefly divided between railway demands and constructional work. Builders of rolling stock are all busy, and orders continue to flow in, while

(*Concluded on Page* 740)

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, March 15	*British* Gross Tons U. K. Ports		*French* Metric Tons Channel Ports		*Belgium and Luxemburg* Metric Tons Channel Ports		*German* Metric Tons Rotterdam or North Sea Port	
Export Prices f. o. b. Ship at Port of Dispatch—By Cable								
PIG IRON	£ s d			Francs		Francs	£ s d	
Foundry No. 3, Silicon 2.50-3.00	$17.01	3 10 0*	$15.34	425	$14.38	340	$17.01	3 10 0
Basic	16.28	3 7 0	15.70	435	14.38	340	15.07	3 2 0
Basic-bessemer	18.61	3 16 6†	15.34	425	13.54	320	17.01	3 10 0
Hematite, Phosphorus 0.02-0.05	20.41	4 4 0	27.26	455	.....	...	18.23	3 15 0
SEMIFINISHED STEEL								
Billets	$26.73	5 10 0	$20.94	580	$19.88	470	$24.30	5 0 0
Wire rods	43.74	9 0 0	27.26	755	26.01	615	27.95	5 15 0
FINISHED STEEL								
Standard rails	$35.24	7 5 0	$26.17	725	$24.75	585	$32.08	6 12 0
Merchant bars	1.49c	6 17 6	1.12c	700	1.06c	560	1.18c	5 7 0
Structural shapes	1.33c	6 2 6	1.05c	650	1.00c	520	1.08c	4 18 0
Plates, ship, bridge and tank	1.52c	7 0 0	1.24c	775	1.12c	590	1.32c	6 0 0
Sheets, black, 24 gage	2.22c	10 5 0	2.13c	1,330	1.99c	1,045	2.64c	12 0 0
Sheets, galvanized, 24 gage, corrugated	3.50c	16 2 6	3.20c	2,000	2.28c	2,200	3.63c	16 10 0
Bands and strips	2.17c	10 0 0	1.42c	890	1.37c	720	1.54c	7 0 0
Plain wire, base	2.39c	11 0 0	1.86c	1,160	1.52c	800	1.71c	7 15 0
Galvanized wire, base	3.04c	14 0 0	2.50c	1,560	2.00c	1,050	2.04c	9 5 0
Wire nails, base	3.15c	14 10 0	2.08c	1,300	.....	850	1.76c	8 0 0
Tin plate, base box 108 pounds	$ 4.74	0 19 6	.....	...	.....	...	$ 6.56	1 7 0
Domestic Prices at Works or Furnace—Last Reported								Marks
Foundry No. 3 Pig Iron, Silicon 2.50-3.00	$17.01	3 10 0	$14.69	407(2)	$13.96	330	$19.55	85
Basic pig iron	16.28	3 7 0	15.78	437(1)	13.54	320	20.24	88
Furnace coke	3.71c	0 15 3	6.06	168	4.86	115	5.06	22
Billets	26.73	5 10 0	19.86	550	20.30	480	27.37	119
Standard rails	1.63c	7 10 0	1.08c	675	1.20c	630	1.48c	142
Merchant bars	1.57c	7 5 0	1.07c	670	1.12c	590	1.39c	133
Shapes	1.44c	6 12 6	1.02c	635	1.08c	570	1.42c	136
Plates, ship, bridge and tank	1.55c	7 2 6	1.25c	780	1.23c	645	1.51c	145
Sheets, black, 24 gage	2.33c	10 15 0	2.12c	1,325	2.04c	1,075	2.24c	215
Sheets, galvanized 24 gage, corrugated	3.50c	16 2 6	3.12c	1,950	4.28c	2,250	3.96c	380
Plain wire	2.39c	11 0 0	1.84c	1,150	1.52c	800	1.85c	177
Bands and Strips	2.38c	10 10 0	1.35c	845	1.45c	765	1.61c	154

*Middlesbrough; †Scotch foundry iron; (1) Basic-bessemer; (2) Longwy. British export furnace coke £0 15s 3d ($3.71) f. o. b. Ferromanganese £15 5s 0d ($74.12) f. o. b. German ferromanganese £14 10s 0d ($70 47) f. o. b.

The equivalent prices in American currency are in dollars per ton for pig iron, coke, semifinished steel and rails; finished steel is quoted in cents per pound and tin plate in dollars per box. British quotations are for basic open-hearth steel; French, Belgian, Luxemburg, and German are for basic-bessemer steel.

Machinery

March Sales Below Expectations—Many Railroads Are in the Market—Surplus Tool Sale in East Develops Low Prices

ON THE whole, purchases of machine tools and shop equipment so far this month have been below expectations. The first week in March was fairly brisk but during the last week the recession has been notable. Business which is placed has been well scattered and involves mostly single machines. One of the largest buyers is Pratt & Whitney Co., which is equipping a shop for the manufacture of airplane engines. Already purchases include 17 milling machines, two lathes, and several heavy duty drills. Nearly all western railroads have lists out. Because of a shop fire at Frankfort, Ind., the Nickel Plate is expected to buy replacement machinery shortly. A sale of 500 surplus tools at Woonsocket, R. I., attracted attention but prices were disappointing.

New York, March 16.—Although railroad demand is somewhat slack, commercial buying of machine tools continues brisk. A leading buyer is the Pratt & Whitney Co., Hartford, Conn., which is closing on equipment for an airplane motor shop. Among orders it has placed are 12 press type milling machines, awarded Kearney & Trecker Corp.; four rigid milling machines and two stub lathes, awarded Manning, Maxwell & Moore Inc.; a side head milling machine, placed with Niles-Bement-Pond Co.; and several heavy duty drills, placed with another seller. Other leading buyers include Singer Mfg. Co., Elizabethport, N. J., which has closed on twelve 5-inch automatic milling machines and six 10-inch automatic milling machines and Moore Drop Forging Co., Springfield, Mass., previously noted as active in the market, which has just placed eight 10-inch automatic milling machines, both orders going to the Pratt & Whitney Co. An outstanding development in the crane market is one award of eight 160-ton wrecking cranes by Southern railway to Industrial Works. Railroad buying includes three drills, two portable lathes, one 42-inch boring mill, and one side rod milling machine for Atchison, Topeka & Santa Fe, and a 90-inch locomotive journal turning lathe for Michigan Central; both orders going to Manning Maxwell & Moore, Inc.

Boston, March 16.—March sales of machine tools are running fully 25 per cent ahead of February sales, and tool builders are operating close to 90 per cent of capacity with unfilled orders running 60 days ahead in many cases. Much interest recently centered in an auction sale of 500 surplus tools at Taft-Peirce Mfg. Co. plant at Woonsocket, R. I. The sale was well attended but prices were disappointing. Sales totaled about $40,000. Some of the principal buyers were Stevens Tyne Co., Boston; Holtzer Cabot Corp., Boston; Grace & Co., Worcester, Mass.; Lucas & Co., Bridgeport, Conn.; and Botwinik Bros., New Haven, Conn. A large boring mill brought $925. Used tool sales have slowed down some, due probably to the many auctions this month. Prices of new tools are unchanged.

Pittsburgh, March 16.—A fair number of sales of machine tools to scattered buyers for immediate needs are noted in the equipment market, with the closing up of the list of the Perry high school inquiry here heading the list. Somers, Fitler & Todd received orders for two drill presses, a motor-driven forge and a motor-driven grinder for this school, and Reliance Machinery Sales Co. was awarded four lathes. Five woodworking machines were eliminated and machines from other schools will be substituted. The next purchase along this line will probably be for the Johnstown, Pa. high school. As soon as fire insurance is adjusted, Hubbard & Co., Pittsburgh, will doubtless prepare its list of replacement equipment. McClintic-Marshall Co. has been buying shears and other fabricating shop equipment, but has not started to ordered against its list of 21 cranes.

CRANE ORDERS PLACED

Eight 160-ton wrecking cranes for Southern railway, to Industrial Works.

Four 2-ton handpower cranes for National Radiator Co., Buffalo, to unnamed builder.

Four 20-ton electric cranes for Baldwin Locomotive Works, Philadelphia, purchased from Joseph Greenspun Sons Iron & Steel Co., St. Louis; these cranes were bought during the war but never were used.

Four additional 25-ton trolleys for Baldwin Locomotive Works, Philadelphia, to Niles Crane Corp.

Three caterpillar gasoline shovels for W. R. Pickering Lumber Co., to American Hoist & Derrick Co.

Two cranes, including 5-ton overhead and 3-ton gantry, for Chicago & North Western, to Milwaukee Electric Crane & Mfg. Corp.

Among single orders were: 25-ton locomotive crane for New England Construction Co., Worcester, Mass., to American Hoist & Derrick Co.; 10-ton handpower crane for power house at Ausable Forks, N. Y., through J. & J. Rogers to New Jersey Foundry & Machine Co.; 3-ton handpower crane equipped with 3-ton electric hoist for Jersey City Stone Works, Jersey City, N. J., to New Jersey Foundry & Machine Co.; 1½-ton handpower crane for Springfield, Mass., dealer, to New Jersey Foundry & Machine Co.; standard locomotive crane for Georgia Creosoting Co., Brunswick, Ga., to American Hoist & Derrick Co.; ditcher for Central of Georgia railroad, to American Hoist & Derrick Co.; standard locomotive crane for Gulf State Creosoting Co., to American Hoist & Derrick Co.; 20-ton used locomotive crane with 1-yard clam shell bucket for Leavitt & Hardy, Inc., Staunton, Va., to Philip T. King; 20-ton used locomotive crane with 2-yard clam shell bucket for Winnsboro Granite Corp., Winnsboro, S. C.; 12-ton gasoline crawler crane for Public Service Gas & Electric Co., to Industrial Works; 5-ton gantry crane for Anaconda Copper Mining Co., for installation in Arizona, to Whiting Corp.; 15-ton electric pillar crane for freight station of railroad at Buffalo, to Whiting Corp.; 10-ton handpower crane for West Virginia Pulp & Paper Co., New York, to Armington Engineering Co.; 175-ton ladle crane for Weirton Steel Co., Weirton, W. Va., to Morgan Engineering Co.; 5-ton rope grab bucket trolley for Weirton Steel Co., Weirton, W. Va., to Shaw Crane Works.

CRANE ORDERS PENDING

Several sheet mill cranes for Weirton Steel Co., Weirton, W. Va.; some revisions made and new bids being taken.

Several cranes for Carnegie Steel Co., including one locomotive crane, for different plants; bids being compiled.

Two 20-ton cranes for Jones & Laughlin Steel Corp., Pittsburgh; bids being compiled.

20 or 25-ton overhead crane for Columbia Steel Co., Butler, Pa.; bids about to be asked.

15-ton electric crane for Pittsfield, Mass., plant of General Electric Co.; previously reported placed, is understood still to be pending.

Chicago, March 16.—Most machinery dealers find sales running about even with last March but lacking the volume they had expected. January this year was better than January a year ago, with February sales the reverse. Now March is on a parity with last March. The delivery situation on standard tools is easier but on special equipment sellers ask up to 90 days. Collections generally are good. Practically all of the western roads have lists out. Santa Fe, which has added a few grinders, may close shortly on its earlier inquiry. New York Central seeks several lathes and a grinder. Burning of the Nickel Plate's machine shop at Frankford, Ind., a few days ago doubtless will call for replacement items. Panama Canal office, Washington, is asking bids, March 27, on a 3-foot radial drill, 32-inch shaper, three portable drills, a sensitive, drill, 18 and 27-inch lathes, and pedestal grinder.

Cleveland, March 16.—For most dealers, equipment business thus far in March has been a disapopintment, sales being below expectations. Considerable business is pending, however. Local manufacturers also are noting a lessened demand, but plant operations are being well maintained. A Detroit automobile manufacturer has just placed 48 machines, consisting of vertical drills and milling machines, with a Cleveland dealer. M. A. Workman, Cleveland, has purchased a 5-inch automatic milling machine; Link-Belt Co., Indianapolis, a hand miller; and Remy Electric division of General Motors Corp., Anderson, Ind., three bench hand milling machines, all these orders going to Pratt & Whitney Co. Used tools still are moving well.

Pig Iron Sales Moderate

(*Concluded from Page 717*)

Alabama iron $22 to $23, Birmingham. Several small sales of silveries were reported at the fixed schedules.

Chicago, March 16.—Sales of northern pig iron show moderate improvement but are light considering the approach of the second quarter and the tonnage of iron for that delivery remaining to be placed. Among consumers the predominant thought still is to wait. Sellers say they are holding to $23, Chicago furnace, for No. 2 foundry and malleable. Foundries have increased their coke obligations. Furnace shipments are averaging higher than in February. Some melters are making spot purchases to round out their March needs. Foundries on railroad work are improving their melt, while those on automobile work are maintaining it. One Milwaukee melter is said to be taking in a car of spot iron daily. Reports of a sale of 1000 tons of malleable to a Milwaukee interest cannot be confirmed. A little resale iron has been offered. The Thomas furnace at Milwaukee has been blown out for repairs to the stoves, which, it is planned, will increase the stack's capacity; relighting April 15 or 20 is scheduled. The special irons are quiet, but firm.

St. Louis, March 15.—Pig iron sales are confined to occasional car lots for prompt delivery. Melters are giving little heed to second quarter requirements. Reports relative to stocks in consumers' hands vary considerably. In some instances they are low, but elsewhere fair reserves are held, and more iron will be carried over at the end of March than was thought likely two months ago. No. 2 southern iron is quotably unchanged at $23, furnace, and the same figure is being asked by northern producers for the base grade. Small tonnages of northern and southern, however, have been placed at $1 below this price. The leading local producer still quotes $23.50 to $24, f.o.b. Granite City.

Work on the new stack of the St. Louis Coke & Iron Corp. is making rapid progress and it is expected that it will be completed early next summer.

Birmingham, Ala., March 15.—Southern pig iron melters have been purchasing for the second quarter and a considerable portion of the probable make has been covered. The larger melters, including some of the pressure pipe makers, have not purchased all the iron they will need. Quotations continue at $22 for No. 2 foundry, with $23 asked on small tonnages.

New York, March 16.—Pig iron demand has improved. The Draper Corp., Hopedale, Mass., placed 3000 tons of foundry iron for second quarter. The Westinghouse Electric & Mfg. Co. placed a tonnage for Springfield, Mass. The Gilbert & Barker Mfg. Co. bought at least 2000 tons for Springfield for second quarter. Richardson & Boynton Co. bought an unknown tonnage, probably 700 tons. The Crane Co. is inquiring for 1000 tons. The Central Foundry Co. and Essex Foundry inquiries still are pending. Buffalo foundry iron is $21, base furnace, and eastern Pennsylvania $22, base furnace. Foreign offerings continue to be made. A moderate tonnage of English low phosphorus iron has been sold.

Iron Ore

Cleveland, March 16.—Lake Superior iron ore prices have not been determined, action on the Ford Motor Co.'s inquiry not being expected for several days. Some bidders understood all quotations were to be in by March 15. One of the largest independent operators anticipates its shipments to associated companies this season will be about equal to those in 1925, based on their recent estimates of requirements.

Scrutinize Terms of India Pig Iron Bounty

Washington, March 16.—Eastern pig iron producers have been conferring with customs officials seeking views as to whether the British Indian government is granting an indirect bounty on pig iron exported to the United States, within the meaning of that section of the tariff law imposing an extra duty equal to the bounty. India grants a bounty on steel ingot production, but customs officials are uncertain whether this amounts to an indirect pig iron bounty. The tariff act provides an extra duty to offset indirect and direct bounties.

Senate Will Investigate Tariff Commission

Washington, March 16.—After weeks of uneasiness in some quarters and uncertainty in others, the senate finally has taken action to start investigation at once of the United States tariff commission, and the latter's difficulty with the flexible sections of the tariff law, which in many cases has been found not to flex.

The committee to conduct the investigation is to be made up of two regular Republicans, Senators Wadsworth, New York, and Reed, Pennsylvania, one "progressive Republican," Senator LaFollette; and two Democrats, Senator Robinson, Arkansas, and Senator Bruce, Maryland, who on numerous occasions voted with the Republicans and whose views on economic questions generally are considered sound.

Investigation is intended to shed light on the reasons for the commission's dilatory action in cases in which the provisions of the flexible sections have been invoked. The commission has been deadlocked between advocates of high protection and of moderate or so-called "scientific" protection. It is believed the investigation will show the extent to which redefinition of the basis for determining foreign competition is necessary. Many foreign costs of production have been practically unobtainable.

Iron and Ore Imports Up

Philadelphia, March 16.—Following are the importations of iron and steel at this port for the week ended March 13: Pig iron, 2200 tons Germany, 225 tons Calcutta, 4900 tons England, 100 tons France, 500 tons Belgium, 62 tons Netherlands; 160 tons structural steel Belgium; 119 tons steel bars, Belgium; 18 tons hoop steel, Belgium; 29 tons charcoal iron bars, Sweden; 162 tons steel billets, Sweden; 100 tons ferromanganese, England; 1091 tons iron ore, Germany; 48 tons manganese ore, England; 2 tons malleable iron castings, England; and 4500 tons chrome ore, Port Africa.

More persons were employed in factories in Illinois in February than at any time since May, 1924. Each month since July has shown an increase. In Chicago the expansion which was stopped in December was resumed in January and maintained in February.

Unfilled Tonnage Drops

Unfilled tonnage on the books of the United States Steel Corp. at the close of business Feb. 28 totaled 4,616,822 tons, a drop of 265,917 tons from the Jan. 31 total. The decline was 5.7 per cent compared with a drop of 3 per cent during January. Following are further comparisons of unfilled tonnage since Jan. 31, 1924:

Date	Total	Change, tonnage	Change, per cent	
Feb. 28, 1926	4,616,822	265,917—	5.7	—
Jan. 31, 1926	4,882,739	150,625—	3.0	—
Dec. 31, 1925	5,033,364	451,584+	9.8	+
Nov. 30, 1925	4,581,780	472,597+	11.5	+
Oct. 31, 1925	4,109,183	391,886+	9.5	+
Sept. 30, 1925	3,717,297	204,494+	5.8	+
Aug. 31, 1925	3,512,803	26,664—	0.756	—
July 31, 1925	3,539,467	170,991—	4.6	—
June 30, 1925	3,710,458	339,342—	8.3	—
May 31, 1925	4,049,800	396,768—	8.4	—
Apr. 30, 1925	4,446,568	416,996—	6.6	—
Mar. 31, 1925	4,863,564	421,207—	7.0	—
Feb. 28, 1925	5,284,771	247,488+	4.8	+
Jan. 31, 1924	5,037,323	220,647+	4.58	+
Dec. 31, 1924	4,816,676	784,707+	19.1	+
Nov. 30, 1924	4,031,969	506,699+	14.3	+
Oct. 31, 1924	3,525,270	51,490+	1.48	+
Sept. 30, 1924	3,473,780	184,203+	5.59	+
Aug. 31, 1924	3,289,577	102,505+	3.02	+
July 31, 1924	3,187,072	75,433—	2.3	—
June 30, 1924	3,262,505	365,584—	11.1	—
May 31, 1924	3,628,089	580,358—	13.19	—
April 30, 1924	4,208,447	574,360—	12.008	—
Mar. 31, 1924	4,782,807	130,094—	2.6	—
Feb. 29, 1924	4,912,901	114,472+	2.3	+
Jan. 31, 1924	4,798,429	350,183+	7.8	+

Forbid Rate Cut

Commission Opposes Lower Rail Charge to Pacific Coast

Washington, March 16.—Application filed first in 1921 by western continental railroads for authority to establish reduced freight rates on iron and steel and other commodities, to Pacific coast terminals, without observing the long-and-short haul provision has been denied in a decision by the interstate commerce commission.

It was sought to reduce the rates from Chicago, on the East, to Denver, on the West, and including a number of origin groups, to the Pacific coast ports to place the manufacturers of the Middle West more nearly upon an equality with their eastern competitors having cheaper water transportation by way of the Atlantic. They did not propose to apply the reduced rates to intermediate destinations.

A basic rate of 80 cents was proposed from group D points, embracing Chicago territory, to meet competition of west bound iron and steel moving through the Panama canal from Pittsburgh at a charge of 76.5 to 77.5 cents. This rate, the commission pointed out, would attract little traffic in commodities moving at a rate of 40 cents from the ports. It was stated that the United States Steel Corp., with its mills in the Chicago district and in the East, including the Baltimore plant, would continue to supply the Pacific Coast in that event from the eastern mills, but that some increase in traffic might be expected from the independent mills in the Chicago district.

The intermountain rate territory almost to a unit was in opposition to the proposals, and Pacific Coast interests were divided in their views. Middle West interests, with the exception of the iron and steel industries of the Steel corporation, supported the application, while the eastern producers and shippers generally opposed the lower rates. In the six months from June to November, inclusive, 1923, iron and steel tonnage moving from these points by rail to the coast totaled 156,085 tons, as against 779,369 tons shipped through the canal. The commission said:

"It appears that when the reduction of 35 cents was made in the rates on iron and steel articles from Chicago to the Pacific Coast terminals in April, 1923, no real benefit accrued to the Chicago mills, nor was the situation materially helped when the water lines increased their rate from 30 to 40 cents some months later. It is said that to meet the competition of the mills east of Pittsburgh it would be necessary to establish a rate from Chicago as low as 60 cents."

The commission's majority report also held that to permit the western carriers to publish the lower rates from Chicago for the avowed purpose of depriving the water lines of traffic would be to disregard wholly the policy of congress to promote, encourage and develop water transportation. Commissioner Erch dissented.

Form Permanent Trade Relations Committee

Washington, March 16.—Following recommendations of the national distribution conferences held here in the last two years, directors of the United States chamber of commerce today authorized a permanent committee on trade relations as a further step toward self-government in business.

The committee, which is to include representatives of manufacturing, wholesaling, retailing and the consuming public, is to be a clearing house for information on adjustment of trade disputes and the suppression of trade practices detrimental to the manufacturer and distributer as well as to the consuming public.

"As at present contemplated, the joint trades relation committee will be composed of one influential member of each trade," said Alvin E. Dodd, of the domestic distribution department of the chamber. "Each of the members of this committee will be the key man in developing in his particular trade a joint trade relations committee to include manufacturers, wholesalers and retailers."

The first task of the committee will be to promote the machinery within industries and business operations to facilitate the adjustment of disputes in the particular industrial or business line.

Cuts Wages 10 Per Cent

New York, March 16.—Central Iron & Steel Co., Harrisburg, Pa., has reduced wages 10 per cent throughout its plant. A similar reduction was made by the Lukens Steel Co., Coatesville, Pa., last August. The lower schedules result from the fact that prices obtained for plates have been too low to justify production by the eastern mills.

S. S. MELINE recently docked at Boston from Rotterdam with 731 tons of pig iron consigned to Pilling & Co. Boston receipts to date total 19,961 tons, or at an annual rate of 120,000 tons, slightly over the 1925 total.

Sheet and Tin Plate Mill Wages Advanced

Youngstown, March 16.—Wages of sheet and tin plate workers represented by the Amalgamated Association of Iron, Steel and Tin Workers will be advanced 3 per cent for March and April, to a level 31½ per cent above base. The average of sales prices of 26, 27 and 28 gage black sheets in January and February was 3.20c, compared with 3.10c in November and December. J. H. Hughes, Trumbull Steel Co. acted for the Western Sheet and Tin Plate Manufacturers association, and M. F. Tighe represented the Amalgamated association at the bi-monthly settlement last Friday. Following is a comparison of average sales prices since January 1925:

Jan-Feb., 1926	3.20c
Nov.-Dec., 1925	3.10c
Sept.-Oct.	3.10c
July-Aug.	3.25c
May-June	3.40c
March-April	3.40c
Jan.-Feb.	3.45c

Would Abolish British Coal Subsidy

London, March 16.—(*By Cable*)—Recommendations for an adjustment in the coal industry this spring have been submitted by the government commission which has been investigation conditions since last summer. They include the following:

Immediate steps toward eliminating government subsidies for mines.

No change in working day but temporary lower wages with minimum subsistence allowance.

No nationalization of mines but state to acquire royalties.

Amalgamation of smaller mines.

Associate coal and allied industries.

Formation of national fuel and power committee.

Government provision for fuel mining research.

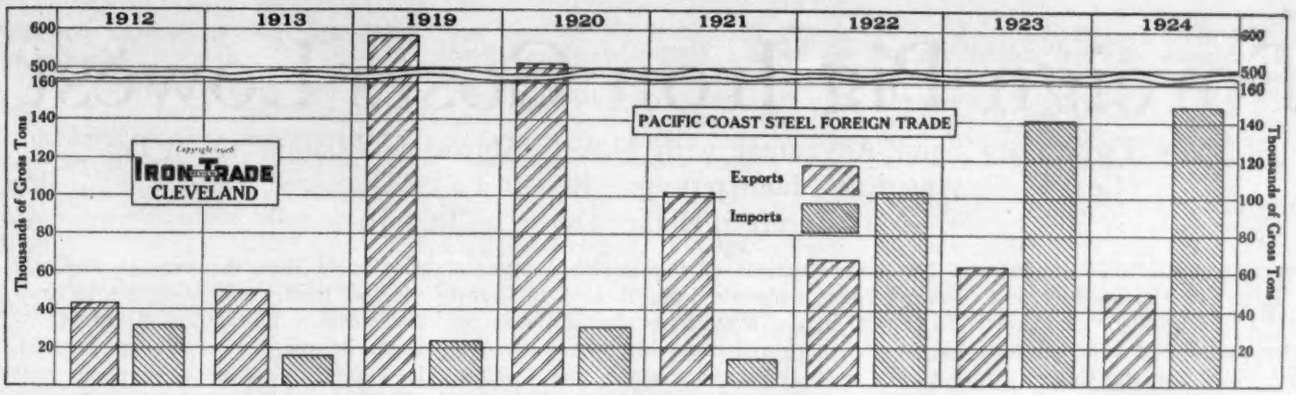
Formation of fuel selling agencies.

Obligatory profit sharing and family allowance system.

National wage agreements on principle with district adjustments.

Work at 1917 Mine Scale

New York, March 16.—Central Iron working for the Pittsburgh Coal Co. under the November, 1917, wage scale, independent of the United Mine Workers of America, passed the 1800 mark for the first time March 11 when 1806 men were reported at work, it was announced by the company. Large numbers of former employes of the company are asking for work at the 1917 scale. More coal than has been produced in any one day at the 1917 scale was loaded at the company's eight mines March 11.



America Losing Pacific Coast Trade

GRADUAL decline in America's favorable balance of foreign trade in iron and steel on the Pacific coast is noted in data just compiled from customs manifests of the department of commerce. Exports have been decreasing annually from 586,085 tons in 1919 to but 50,767 tons in 1924 while imports during the same time have gained from 23,470 tons to 148,022 tons.

Much of the gain in imports is due to heavier pig iron receipts, this product amounting to 53,799 tons in 1924 compared with 17,176 tons in 1912. Invasion of the Pacific Coast by European tubular products manufacturers also is contributing to heavier imports. In 1924, 30,095 tons of pipe and tubular products was imported, 27,572 tons going into the Los Angeles port.

Following are further comparisons of imports and exports through Pacific Coast ports for 1912 and 1913, and 1919 to 1924.

IMPORTS BY PORTS

Gross Tons

	Los Angeles	San Francisco	Oregon	Washington	Alaska	Total
1912	1,805	17,056	6,789	6,586	9	32,245
1913	.....	14,498	2,649	.....	....	17,147
1919	.....	6,840	2	16,628	....	23,470
1920	1,663	15,333	13	14,195	....	31,205
1921	3,325	8,283	376	2,575	1	14,560
1922	45,051	39,888	3,704	14,356	2	103,001
1923	41,804	60,323	7,486	32,172	6	141,791
1924	54,691	47,871	10,509	34,934	17	148,022

EXPORTS BY PORTS

Gross Tons

	Los Angeles	San Francisco	Oregon	Washington	Alaska	Total
1912	10	4,296	.....	38,760	77	43,143
1913	.....	2,674	.....	47,614	....	50,288
1919	.....	152,085	13,888	420,094	18	586,085
1920	11,803	199,717	31,969	268,366	35	511,890
1921	3,429	41,514	10,250	47,347	360	102,900
1922	2,887	18,438	8,027	38,535	166	68,053
1923	3,321	24,772	2,926	31,986	100	63,105
1924	8,593	15,538	3,154	23,322	160	50,767

Accidents at coal mines in the United States in January caused the death of 318 men, according to reports to the bureau of mines, department of commerce. The unusually large total for the month was due to four major explosions that caused the death of 142 men.

PACIFIC COAST EXPORTS BY PRODUCTS

Gross Tons

	1912	1913	1919	1920	1921	1922	1923	1924
Pig iron, no alloys	753	.....	12,681	1,127	290	523	187	32
Iron, steel scrap	2,720	2,641	13,817	20,382	7,729	32,869	9,459	9,277
Ingots, blooms, etc.	.....	.....	961	2,157	89	14	4	1
Iron bars	638	2,194	16,031	4,189	497	.....	470	531
Steel bars	.....	.....	.....	.....	.....	2,983	11,748	2,239
Alloy steel bars	6,090	8,687	160,481	185,285	18,636	276	182	41
Wire rods	34	.....	27,651	33,172	1,574	835	6,071	1,294
Boiler plate	.....	.....	.....	.....	.....	25	40	46
Other plates, not fabricated	.....	.....	197,827	79,666	15,753	2,628	605	1,579
Skelp iron or steel	.....	.....	.....	.....	.....	.....	1	1,699
Galvanized sheets	.....	.....	12,249	7,503	1,092	446	1,271	745
Black steel sheets	11,493	3,572	31,655	29,257	22,074	5,860	1,695	4,825
Black iron sheets	317	.....	11,182	14,108	1,486	317	291	88
Strip steel, cold	.....	.....	.....	.....	.....	22	4	10
Hoops, bands, etc.	471	242	5,098	5,790	807	997	998	473
Tin plate	3,146	5,812	37,615	29,560	8,309	435	735	844
Structural shapes, plain	72	5,606	570	12,782	5,172	3,377	642	1,267
Structural shapes, fabricated	.....	.....	.....	.....	.....	2,239	390	251
Ship and tank plates	.....	.....	4,668	4,091	809	21	110	1,663
Metal lath	.....	.....	.....	.....	.....	.....	88	430
Other structural shapes	.....	.....	.....	.....	.....	686	6,304	5,485
Rails over 50 pounds	.....	.....	.....	.....	.....	2,419	2,967	5,431
Rails under 50 pounds	10,195	6,496	.....	.....	.....	341	341	63
Splice bars, etc.	.....	.....	.....	.....	.....	1,177	534	789
Switches, frogs, etc.	.....	.....	.....	.....	.....	165	239	107
Railroad spikes	.....	.....	.....	2,133	748	471	352	343
Railroad bolts, nuts, etc.	.....	366	5,904	4,560	1,237	93	40	53
Boiler tubes	.....	.....	.....	.....	.....	277	236	121
Gas and oil line pipe	.....	.....	.....	.....	.....	262	233	561
Welded black pipe	.....	.....	.....	.....	.....	1,228	1,189	864
Welded galvanized pipe	.....	.....	.....	.....	.....	232	216	485
M. I. S. pipe fittings	.....	.....	.....	14,578	10,014	159	371	330
Cast iron pipe fittings	.....	.....	.....	.....	.....	932	437	271
Cast iron pressure pipe and fittings	.....	.....	.....	.....	.....	.....	.....	205
Cast iron soil pipe and fittings	5,342	12,662	2,593	2,027	740	.....	.....	51
Plain wire	.....	.....	.....	.....	.....	490	1,557	324
Galvanized wire	1,104	452	.....	.....	.....	722	1,263	1,113
Barbed wire	115	.....	761	1,179	240	160	254	308
Woven wire and fencing	.....	.....	.....	.....	.....	110	180	62
Wire cloth and screening	.....	.....	.....	.....	.....	38	53	204
Wire rope	.....	.....	.....	.....	.....	471	561	334
Insulated wire and cable	.....	.....	.....	.....	.....	32	245	35
Other wire and manufactures of	.....	.....	25,272	31,687	3,614	367	208	157
Cut nails	42	.....	105	55	8	19	9	22
Wire nails	276	1,292	17,615	25,905	1,824	488	8,666	4,098
Horseshoe nails	.....	.....	.....	.....	.....	12	15	2
Other nails and tacks	287	266	1,259	697	158	56	107	64
Ordinary bolts, nuts, etc.	.....	.....	.....	.....	.....	260	412	345
Iron castings	40	.....	.....	.....	.....	184	176	123
Steel castings	3	.....	.....	.....	.....	169	168	209
Car wheels and axles	5	.....	.....	.....	.....	2,135	665	809
Iron and steel forgings	.....	.....	.....	.....	.....	31	116	64
Horseshoes	.....	.....	.....	.....	.....	.....	.....	.....
Totals	43,143	50,288	586,085	511,890	102,900	68,053	63,105	50,767

PACIFIC COAST IMPORTS BY PRODUCTS

Gross Tons

	1912	1913	1919	1920	1921	1922	1923	1924
Iron ore	.....	.....	1,791	1,141	1,288	1,270	3,462	3,078
Pig iron	17,176	9,667	6,984	657	799	54,086	83,188	53,799
Iron and steel scrap	769	.....	11,708	24,447	4,999	12,869	14,784	4,438
Iron bars	1,918	646	586	479	.....	662	3,088	1,387
Wire rods	10	.....	125	14	257	382	439	136
Boiler and other plate	.....	.....	.....	.....	.....	247	1,664	1,010
Steel ingots, bars, etc	9,791	725	110	278	6,397	17,853	9,827	11,845
Iron and steel sheets, skelp, etc.	584	323	.....	.....	.....	286	1,754	847
Tin plate	182	.....	8	770	114	1,452	1,305	199
Structural shapes	1,309	5,069	9	45	10	953	5,187	8,933
Rails	206	717	1,149	3,374	696	12,059	14,275	17,762
Tubular products	.....	.....	.....	.....	.....	69	169	30,095
Round wire	.....	.....	.....	.....	.....	221	1,314	1,584
Wire rope	.....	.....	.....	.....	.....	3	675	12,263
Flat wire and strip steel	.....	.....	.....	.....	.....	68	23	.....
Nails and screws	.....	.....	.....	.....	.....	35	207	121
Bolts, nuts, rivets	.....	.....	.....	.....	.....	6	58	35
Castings and forgings	300	.....	.....	.....	.....	480	372	490
Totals	32,245	17,147	23,470	31,205	14,560	103,001	141,791	148,022

Foreign Pig Iron Costs Lowest

New Tariff Data Show Advantage with Makers Abroad Is from 18 to 33 Per Cent Under American Manufacturers—Report To Be Discussed April 20—May Result in Higher Duties on Imports

WASHINGTON, March 16.—In advance of a hearing scheduled for April 20 on the question of a higher duty on foreign pig iron, the United States tariff commission has completed a preliminary report on differences in cost of pig iron production in the United States and abroad. The report covers a period from the beginning of 1922 to last December. It is the first to set forth comprehensively pig iron production costs in this country and abroad and discloses some interesting facts to the iron and steel industry.

Based on the f.o.b. plant invoice prices of imported pig iron, it is shown that in 1924, average production costs of foundry and malleable iron in British India, Great Britain and continental countries, including Germany, France, Belgium and Luxemburg, were 29.1 per cent lower than the average f.o.b. plant cost of production in the eastern, Buffalo and Alabama districts in the United States.

On the basis of the f.o.b. plant invoice prices of the imported foundry and malleable iron, it also is shown that the average production costs of foundry and malleable iron in the continental countries alone was 31.2 per cent lower than the costs of production, f.o.b. plant, in the same three districts in the United States in 1924.

Comparing the average total cost of foundry and malleable iron delivered in Philadelphia from the eastern, and Alabama districts in 1924 with the total average cost of iron from British India, Great Britain and continental countries, delivered at Philadelphia, based on the invoice prices, in the same year, the report shows the latter costs were 20.8 per cent lower than the former. Total average cost of basic delivered in Boston shows the foreign costs 24.2 per cent lower than the cost of domestic basic delivered at Boston from the Buffalo district.

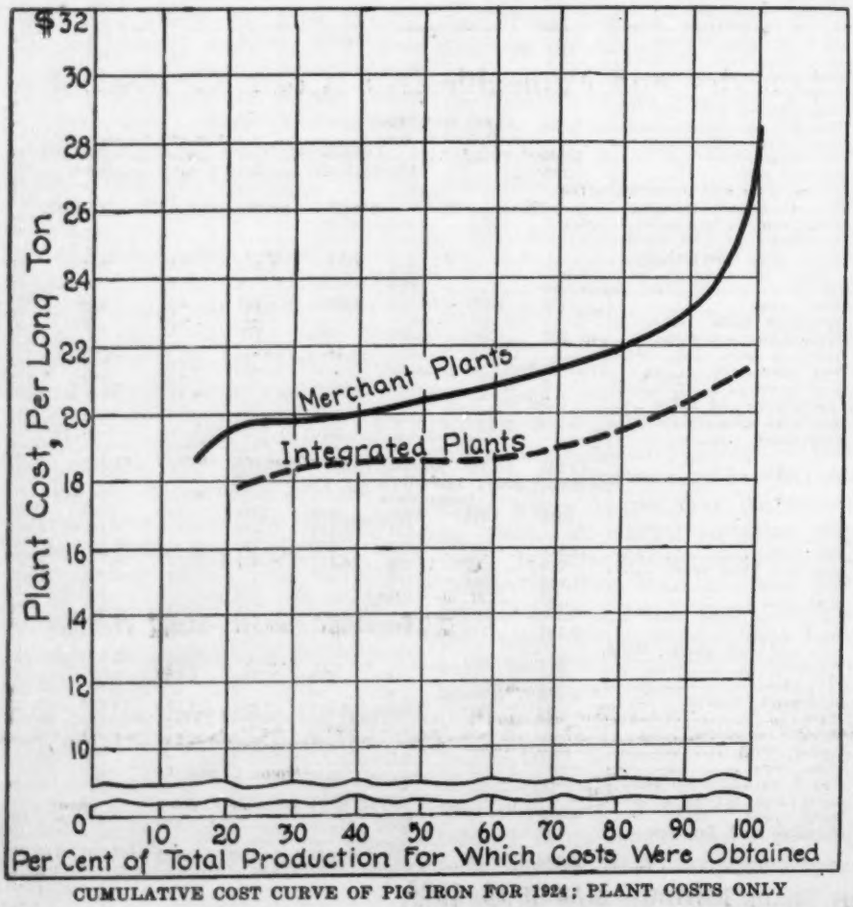
Comparing domestic and foreign costs of basic iron, the report discloses average f.o.b. plant invoice prices of British Indian basic were 33.5 per cent lower than the average domestic costs of basic from producers in eastern, western, Buffalo and Alabama districts of the United States in 1924. In the same year the average cost of British Indian basic delivered in Philadelphia was 17.6 per cent lower than the average cost of basic delivered at Philadelphia from the same four United States pig iron producing districts.

Cost data were not obtained by the metals division of the tariff commission from foreign producers of pig iron but a study was made of invoices of approximately 80 per cent of all imports entered at the ports of Boston, New York and Philadelphia during the period Jan. 1, 1922, to Nov. 30, 1925, inclusive. It is pointed out that many of these invoices failed to specify the kind of pig iron and others were unsatisfactory in that they did not include prices in sufficient detail. The final tabulation, it is announced, included only invoices containing definite reliable information. Domestic costs are from producers' books.

The investigation of differences in costs of pig iron production was started by the commission under the so-called flexible section of the tariff act of 1922, by which the President is authorized to increase or decrease existing duties by 50 per cent to equalize differences in cost of production between domestic and foreign products, on March 27, 1923. Following a preliminary survey in April of that year, cost schedules were prepared, and field work was begun in July, ran through August, 1923, and was continued in April, May and June of last year.

Applications from the Eastern Association of Pig Iron Manufacturers, dated Dec. 7, 1922, and Sept. 22, 1924, requested an investigation looking toward an increase in the present rate of duty, 75 cents per ton, on pig iron, as provided in paragraph 301 of the Fordney-McCumber tariff act of 1922.

Cost data were obtained in the domestic investigation for foundry, malleable, basic, bessemer and low phosphorus pig iron. The report states that as it was not possible to segregate the cost of foundry and malleable pig iron, the combined costs of the two are given. No cost data were obtained for charcoal, forge or silvery



CUMULATIVE COST CURVE OF PIG IRON FOR 1924; PLANT COSTS ONLY

pig iron, as none of these appear to be imported.

At the hearing to be opened in the offices of the tariff commission at 10 a. m. April 20, interested parties will have an opportunity to produce evidence and to be heard. Their attention is directed to the following questions:

1. Are foundry irons, domestic and foreign, of different chemical analyses competitive with one another?
2. Does any particular kind of imported iron, such as No. 3 Middlesbrough displace a particular kind of domestic iron in the United States? Does it particularly affect more than one kind of domestic iron in the United States?
3. Are there fixed differentials for high silicon content for imported pig iron?
4. Should comparison between the cost or price of imported iron and the cost of production in the United States be limited to the costs in merchant plants or to the costs in all domestic plants?
5. Are cost comparisons for the year 1924 representative of the differences in cost of pig iron in the United States and the principal competing countries?
6. To what extent are invoice prices of pig iron indicative of foreign costs of such iron? To what extent may such invoice prices be taken into consideration as evidence with respect to foreign costs of production? To what extent may such invoice prices be regarded as adequate evidence of such costs in absence of book costs secured by field investigation in country of origin?
7. Should adjustment in cost be made for idle time?
8. To what extent does imported pig iron account for idleness in: Merchant plants? Integrated steel plants?
9. Evidence in respect to the principal competing country?
10. What are the principal wholesale markets of the United States for pig iron?

On the general subject of competitive conditions, the report states:

"British India has large modern furnace plants and adequate supplies of raw materials. Because of its cheap raw material and labor, and its comparatively low freight rates, it is of growing importance in the world's markets. Germany has within recent years remodeled and improved many of its blast furnaces. France and Belgium have built modern furnaces.

"The plants of France, Belgium, and Great Britain are of smaller unit capacity than those in the United States. The pig iron industries of France, Germany, and Great Britain, and in recent years of British India, produce an amount of pig iron considerably in excess of their local needs and, therefore, have surpluses available for export. Blast furnace plants of the United States have on the whole larger unit capacity and are more modern than those of other countries, except possibly India.

"As the cost of transportation constitutes a large proportion of the total cost of pig iron, domestic pig iron is marketed within a relatively short distance of production.

"On the Atlantic seaboard the imported iron competes with the iron produced in the eastern districts. The furnaces of the eastern district, principally the merchant furnaces, which manufacture for the open market, therefore bear the brunt of competition from abroad. Foreign competition is also felt somewhat by the inland furnaces, such as those of Buffalo, Virginia, and Tennessee. The Alabama furnaces formerly sold appreciable quantities along the Atlantic seaboard, but high transportation costs, even by the all-water route, have resulted in the loss of a large part of this trade. Virginia and Tennessee furnaces are also handicapped in reaching important consuming markets by reason of high transportation costs. The local markets being insufficient to absorb their full production, most of the furnaces of this region have been idle during 1924 and 1925.

"Foreign producers have, with respect to transportation costs, an even greater advantage along the Pacific and Gulf coasts than along the Atlantic seaboard.

"Water rates on foreign pig iron are so low as to make possible transportation to the United States over long distances. The rail rates for iron from the inland furnaces of the United States to domestic consumers often considerably exceed the ocean freight rates from foreign countries to our Atlantic seaboard. Pig iron can be shipped for about $3 per ton from Europe to the Atlantic seaboard and for about $4 per ton to the Pacific coast. The ocean rate from Calcutta, the principal port from which British Indian iron is shipped, is about $5 per ton to Atlantic ports. The domestic coastwise rate from Atlantic to Pacific ports is $6.72 per ton. The combination overland rate is $14 to $23 per ton, which prevents overland shipments.

"Most furnace plants maintain their own sales offices in the chief centers of consumption. They also sell through other agencies. These agencies, in order to provide their trade with a great variety of pig iron, frequently handle the product of several furnace companies."

The report gives the average selling expense of foundry and malleable pig iron exclusive of handling charges, July 1, 1922 to March 31. 1923, and calendar year 1924, as follows:

(Per long ton)

District	1922-23	1924	Per cent increase or decrease
Eastern	$0.34	$0.37	+ 8.5
Buffalo	0.62	0.51	—17.7
Virginia-Tennessee	0.31	.....	.....
Alabama	0.36	0.36	.....
Western	0.56	0.45	—18.2
Average, not weighted..	$0.47	$0.40	—14.9

Continuing the report states:

"On the basis of rated capacity, cost data were obtained for about 36 per cent of the pig iron in the United States. Those data represent more than 36 per cent of actual production; costs represent approximately 66 per cent of the production east of the Alleghenies and south of the Ohio river, and 30 per cent of the western district. The weighted average ratio for all the districts studied is 38 per cent."

Foundry and Malleable Iron Costs Compared

(Per long ton)

	Domestic iron			Foreign iron		
	Eastern district	Buffalo district	Alabama district	British India	Great Britain	Continental countries*
Costs, transportation not included: f.o.b. plant	$25.17	$22.17	$19.39	$13.36	**$18.66	$15.29
Cost or price, transportation included:						
F.o.b. plant	25.17	22.17	19.39	13.36	18.66	15.29
Transportation and other charges(†) to Philadelphia	††1.25	.....	6.01	6.55	3.52	5.09
Same, to Boston	.....	4.91	.....	6.65	3.52	4.09
Total cost delivered in Philadelphia	26.42	.....	25.40	20.01	22.18	19.38
Same to Boston	.....	27.08	.....	20.01	22.18	19.38

*Includes the costs for plants located in Germany, France, Belgium, and Luxemburg.

**Approximate figure. From price f.o.b. foreign port, $0.90 has been deducted to cover inland freight.

†Other charges include consular fee, brokerage, transshipment, and insurance.

††Average. Rates range from 0.76 to $1.39.

Domestic costs are from producers' books and foreign costs are taken as indicated by invoice prices.

Domestic and Foreign Cost of Basic Iron

(Per long ton)

	Eastern district	Western district	Buffalo district	Alabama district	British India iron
Costs, transportation not included f.o.b. plant	$20.73	$21.67	$19.68	$13.20	$12.51
Cost or price, transportation included:					
F.o.b. plant	20.73	21.67	19.68	13.20	12.51
Transportation and other charges (*) to Philadelphia	†1.25	5.63	4.91	6.01	6.66
Total cost delivered in Philadelphia	21.98	27.30	24.59	19.21	19.17

*Other charges include consular fee, brokerage, transshipment, and insurance.

†Average. Rates range from $0.76 to $1.39.

Domestic costs are from producers' books and foreign costs are taken as indicated by invoice prices.

Here and There in Industry

Live Information Which Records the Expansion of Various Lines of Productive Enterprise

WALTER BATES STEEL CORP., Gary, Ind., has been formed by Walter A. Bates, formerly vice president of the Bates Expanded Steel Truss Co., Chicago. The first unit of its plant, 150 x 200 feet, will be started shortly. The company will manufacture steel poles, transmission towers, sash and similar products. Walter A. Bates, 544 Pierce street, Gary, is president, Luke D. Stapleton vice president and B. C. Johnson secretary. The American Bridge Co. has been given the contract for steel for the plant. The second unit will be 100 x 200 feet.

* * *

COPPER and Brass Research association, 25 Broadway, New York, has added two members, the American Metal Co., Ltd., and the Wheeler Condenser & Engineering Co., both of New York.

* * *

SPECIALTY BRASS CO., Kenosha, has removed its works to a section of the former plant of the Winther Motor Truck Corp., and has added five brass furnaces and an oil furnace.

* * *

INTERNATIONAL NICKEL CO. is having plans made for an addition to its plant at Port Colborne, Ont. The addition is designed to produce 600,000 pounds of electrolytic nickel per month. Other units will be added later to increase production considerably.

* * *

DETROIT STOKER CO., Detroit, manufacturer of Detroit underfeed stokers, has completed a foundry, pattern shop and storage at Monroe, Mich., equipped with automatic foundry devices to increase output. The company has found several extensions necessary, moving from Detroit to Monroe two years ago to obtain larger quarters.

* * *

BERKS FOUNDRY & MFG. CO., Hamburg, Pa., has elected W. T. Adams president, Alex Luria first vice president, W. S. Thomas second vice president and general superintendent, G. Frank Rickert secretary-treasurer, W. G. Snyder assistant secretary-treasurer, Charles K. Derr solicitor. The company has a plant at West Hamburg and one at Watsontown.

* * *

WHITING CORP., Harvey, Ill., recently made an unusually large crane shipment, requiring 16 cars. It consisted of two electric traveling cranes, each with main hoist of 200 tons capacity and auxiliary hoist of 25 tons. The crane span is 58 feet and the vertical lift 110 feet. The cranes were built for the New York Edison Co. and are being erected in East river station in New York.

* * *

SANDUSKY TOOL CORP., Sandusky, O., has been incorporated to take over the business of the Sandusky Tool Co. W. F. Seitz and Alden Seitz recently withdrew from the company and a change in ownership is believed to have taken place. Announcement has been made that George A. Schwer will remain as president and Wulbur Schwer secretary and manager.

* * *

BLACK & DECKER MFG. CO., Towson, Md., which recently bought the Marschke Mfg. Co., Indianapolis, Ind., will continue it as an Indiana corporation with F. W. Marschke, president, W. A. Rowe, production manager for the Black & Decker Co., will be vice president, A. G. Decker treasurer and W. C. Allen, industrial sales manager for Black & Decker Co., secretary. W. A. Marschke and these four officers constitute the board of directors.

* * *

MOLOCH CO., Kaukauna, Wis., manufacturer of automatic stoking equipment, power hammers, paper and pulp mill machinery and other mechanical devices, is being reorganized and refinanced to provide larger working capital. C. Raught has been elected president, J. M. Brown vice president, H. Weifenbach secretary, R. M. Kanik general manager. Directors are: L. F. Nelson, H. S. Cook, C. Jacobson and F. A. Towsley.

* * *

LACLEDE STEEL CO., St. Louis, has contracted with the Chapman-Stein Furnace Co., for a continuous billet-heating furnace at its plant at Alton, Ill. Billets 1½ x 1⅝ x 10 feet will be charged cold and heated by top firing to a rolling temperature of 2250 degrees. The furnace will be fired by producer gas and is equipped with a a recuperator. Six to 10 tons of billets will be heated per hour with a consumption of not more than 150 pounds of coal per ton of steel.

* * *

ORGANIZATION of a company to market products in Canada and the United States is to be effected by Express Marine Engineering & Welding Co., 134 Stanley street, West Melbourne, Australia. Headquarters at present are at 1010 Santa Fe building, San Francisco, F. L. Gridner, manager and D. B. Levake, construction engineer, are in San Francisco. They plan to dispose of some of the patent rights by license to manufacture and market steel products.

* * *

SAMUEL INSULL utility interests are reported to be planning the distribution of surplus and Sunday gas from the Gary-Indiana Harbor district in Indiana through a large part of northern and western Indiana. Gas from the Inland and Youngstown companies is now being piped as far as Kokomo, Ind. It is said negotiations will be conducted for the surplus gas of the Illinois Steel Co. Pipe lines which have been carrying natural gas northward will be utilized for carrying steel works gas southward.

* * *

LEE & CLARK, Chicago, has been incorporated recently to take over the business conducted as a partnership under the name of the James T. Lee Co. James T. Lee is president and John O. Clark is vice president. Offices are at 549 West Washington boulevard. The company produces hydraulic equipment, plate-working tools, metalworking machinery and specialties. Mr. Lee formerly was vice president of the Hanna Engineering Works, Chicago and for the past five years western manager for the Southwark Foundry & Machine Co. Mr. Clark for several years was advertising manager of Hanna Engineering Works.

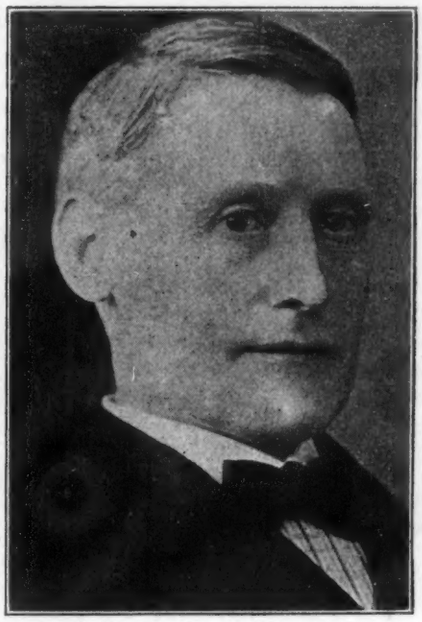
Industrial Men in the Day's News

James E. Jones, Honored for 40 Years Prominence in Roll Design

STEEL roll designing is a highly technical profession, yet without more than primary schooling he has earned for himself the title of "dean of roll designers."

TRIBUTE has been paid him not only for his contribution to steel rolling problems but also because his kindly assistance has helped many other men win success in the iron and steel industry.

HE ASKS nothing better than to spend his recreational time out in the open with rod, reel and creel or a gun. He also has a penchant for the better class of music.



TRIBUTE such as associates and friends paid James E. Jones, superintendent, roll department of South Chicago works of the Illinois Steel Co., at the Pittsburgh Athletic club March 6, flows from a lifetime of service and kindliness. Here was no special anniversary to be marked, nor any immediate achievement to be acclaimed—only a dinner, felicitations and a presentation to manifest outwardly the growing appreciation of Mr. Jones' contribution to the science of mill layouts and roll design and the spirit of helpfulness and encouragement he has left along the way. Yet acclamation of such a spontaneous nature is all the more valued because bred of sincere regard.

In the solution of the more difficult roll problems faced by the larger producers of heavy finished steel for practically two score years Mr. Jones has played a large part. The advances he has made in this highly technical field have not been restricted within the South Chicago works. More credit is due him that the matter of expediting production on three blooming, two rail, two structural and three plate mills in addition to the forthcoming 12, 16 and 18-inch alloy bar mills at South Works looms large enough to monopolize any engineer's time.

Mr. Jones, who was born in Wales about 60 years ago, comes naturally by his liking for the iron and steel industry. His family tradition is rooted in the British metalworking industry. What little formal education was to be his was received in Philadelphia and Troy, N. Y., where his parents resided after their emigration to the United States. When he was not quite 11 years old Mr. Jones went to work, and the broad technical knowledge with which he is gifted today has been acquired wholly through his efforts at self-betterment.

From his job as roll turner in the Achill Thomas works at Pittsburgh he went to the Pencoyd Iron Works before it had been absorbed by the American Bridge Co. Next he swung west to the Colorado Fuel & Iron Co., Pueblo, Colo., where he served six years and was made roll designer. Similar connections followed with the Passaic Steel Co., Passaic, N. J., and the Dominion Iron & Steel Co., Sydney, N. S. With a promotion to superintendent for Seaman, Sleeth & Co., now the Pittsburgh Rolls Corp., he returned to Pittsburgh and 20 years ago, in 1905, went to his present post with the Illinois Steel Co.

Nothing engages Mr. Jones more closely than the rolling of a difficult section and he has been instrumental in the design of many new mills. His latest achievement is a device attachable to roll lathes for corrugating the rolls used in making the new ribbed angle splice bars. That he has encouraged other roll designers and shared his developments with the industry as a whole is evidenced by the Pittsburgh dinner, which more than 50 associates and friends, roll shop superintendents, roll designers, roll makers and plant leaders, attended from all over the country. On that occasion H. L. James, general manager of the Pencoyd works, American Bridge Co., as toastmaster, referred to Mr. Jones as the greatest of roll designers and a man whose assistance of others has revered him to his friends.

That year would be lost to Mr. Jones, in which he did not indulge in the sports of fishing and shooting. In recent years the clay pigeons have attracted him. He has always found rest and inspiration in music and in his home is a collection of approximately 2000 phonograph records. Jazz, it may be noted, is conspicuously absent.

Men of Industry

Personal News of a Business Character Pertaining to the Iron and Steel and Related Fields of Enterprise

JAMES F. MILLER, president and general manager of the Interstate Foundries Inc., Clearing, Ill., and Cleveland, has resigned effective March 1. Mr. Miller is also president and general manager of the Miller-Hurst Corp., Detroit, specialists in foundry and factory production methods and equipment, to which he will devote his entire attention after a month's rest. Mr. Miller became executive of the Interstate foundries in 1924 when it was inoperative after a receivership, and leaves the reorganized company on a substantial footing.

* * *

C. F. Williams has been elected president of the Acme Motor Truck Co., Cadillac, Mich. John H. Weller has become general manager.

* * *

Charles M. Schwab, chairman of the board of the Bethlehem Steel Corp., returned from Europe March 10 on the liner MAJESTIC.

* * *

John H. Goss has become chairman of the executive committee, New Britain Machine Co., New Britain, Conn., succeeding E. Allen Moore, retired.

* * *

Fred A. Cornell, vice president of the C. G. Spring & Bumper Co., Detroit, Mich., has been elected secretary of the company.

* * *

J. E. Moss, president, J. E. Moss Iron Works, Wheeling, W. Va., has been elected president, Massillon Steel Joist Co., Canton, O.

* * *

H. B. Rust, president, and J. S. Brookes, secretary of Koppers Co., Pittsburgh, have been elected to the directorate of the United Light & Power Co., Cleveland.

* * *

G. G. Mills, formerly manager and vice president, Riley Engineering & Supply Co., has been appointed district manager of the Babcock-Wilcox Co. and the Goldie-McCulloch Co., Ltd., at Toronto, succeeding the late William McKay.

* * *

L. S. Allen has been placed in charge of the newly opened Tulsa, Okla., office of Central Steel Co., Massillon, O. Mr. Allen has in the past worked in Eastern steel mills and also has had many years of contact with the oil drilling industry.

* * *

Frank G. Eppley, production manager and in charge of gear and speed reducer sales for the Albaugh-Dover Mfg. Co., Chicago, recently

LEONARD C. CREWE
New vice president of the Robesonia Iron Co., Philadelphia, as announced in IRON TRADE REVIEW, recently

was made a director of that company.

* * *

Warren D. Blatz, general sales manager, and Walter R. Clark, general works manager, Bridgeport Brass Co., Bridgeport, Conn., have been elected directors of the company.

* * *

E. M. Ivens has resigned as New Orleans representative, Ingersoll-Rand Co., New York, to become special agent for the Chicago Pneumatic Tool Co. at Chicago.

C. T. Chapman, representative at Scranton, Pa., has been transferred to the Cleveland office.

* * *

Harrison Collister has been transferred from Cleveland to the New York office of the Warner & Swasey Co., Cleveland, to assist Eugene Gardner in eastern territory.

* * *

Wm. O. Lange, formerly assistant sales manager, Phoenix Iron Co., Philadelphia, has been appointed assistant secretary and general sales manager.

* * *

Raymond H. Sullivan, vice president and general manager, North & Judd Mfg. Co., New Britain, Conn., hardware manufacturer, has severed connection with that company. Michael O'Hayer has succeeded Mr. Sullivan.

* * *

W. E. Worme has resigned his sales connection with the Jones & Laughlin Steel Corp., at New York, to become associated in a similar capacity with Egleston Bros. & Co., Long Island City, N. Y., iron and steel jobbers.

* * *

J. W. Millspaugh, formerly assistant works manager, Chain Belt Co., Milwaukee, has been made works manager, succeeding J. C. Merwin, recently elected a vice president. Fred Kau is assistant to Mr. Millspaugh.

* * *

Harry G. Bow, formerly with the sheet and plate division of the Youngstown Sheet & Tube Co. at Detroit, has become associated with the Superior Sheet Steel Co., Canton, O., as manager of the specialties division.

* * *

Andrew R. Johnson, formerly district sales agent, Trumbull Steel Co., at Chicago, has been appointed to a similar capacity at New York.

L. J. Simmonds, assistant to Mr. Johnson at Chicago, has become district sales manager there.

* * *

George E. Cullinan has been elected a director and vice president in charge of sales, Graybar Electric Co., Chicago.

Leo M. Dunn has been elected vice president in charge of merchandising and accounting.

* * *

R. H. Sonnborn, formerly with the Colorado Fuel & Iron Co., has been appointed district manager, Youngstown Sheet & Tube Co. at Detroit. R. J. Mullally, formerly superintendent of one of the sheet mills of the latter company at Youngstown. has joined the Detroit sales force.

* * *

S. C. Allyn has been elected treas-

urer of the National Cash Register Co., Dayton, O., succeeding H. G. Carnell, retired. Mr. Allyn has been comptroller of the company since 1917.

* * *

Ora G. Smith, formerly sales engineer of the Heltzel Steel Form & Iron Co., Warren, O., has resigned to become assistant to the general superintendent of the Meehan Boiler & Construction Co., Lowellville, O.

* * *

Warren J. Davis, chairman of the board and treasurer, J. I. Case Threshing Machine Co., Racine, Wis., has resigned these duties but remains a member of the board. Leon R. Clausen, president also will serve as treasurer. Mr. Davis sailed March 13 for Europe to remain abroad several months.

* * *

E. P. Cullum, for the past 30 years allied with the former Phoenix Iron Works, Meadville, Pa., has assumed management of the new plate department recently added to the Blystone Mfg. Co., Cambridge Springs, Pa., manufacturer of concrete mixers.

L. C. Zimmerman, also for many years with the Meadville organization, will have charge of production.

* * *

L. J. Galbreath now is associated with the American Brown-Boveri Electric Corp., where he will have charge of advertising and sales promotion. Mr. Galbreath formerly was connected with the Bridgeport Brass Co. in the advertising department. Since graduating from Cornell university he has also been connected with the Niles-Bement-Pond Co., New York, and at one time was works manager of the Columbia Machine Works, Brooklyn.

* * *

G. A. Olofson, formerly vice president, Fenton Machine Tool & Die Co., Fenton, Mich., has been elected president, succeeding Almas Westman, retired Feb. 28. Other officers of the company are: C. J. Olofson, vice president and production manager; J. A. Day, vice president and sales manager, and C. H. Lea, secretary and treasurer.

Lakeview Iron Works, Chicago, has increased capital from $15,000 to $20,000 and 600 shares no par value.

Obituaries

FELIX A. JACOBS, retired, an organizer of Kilbourne & Jacobs Co., Columbus, O., died at his home there recently. About 45 years ago Mr. Jacobs organized the Jacobs Bros. Co., later the Kilbourne & Jacobs Co., manufacturing agricultural machinery and later cars and hoisting equipment.

* * *

William L. Coop, co-founder of the Narragansett Machine Co., Providence, R. I., and prominent in the Providence Engineering society died recently at his home.

* * *

George H. Ganson, 61, president of the Dover Fire Brick Co., Cleveland, died unexpectedly at his home there March 10. Mr. Ganson was born in Amherstburg, Ontario, and began as a clerk with the Dover company 40 years ago.

* * *

John N. Allen, for the past three years purchasing agent for Donner Steel Co., Buffalo, died recently. Mr. Allen formerly served in similar capacities with the Lackawanna Steel Co., Buffalo, and the Brier Hill Steel Co., Youngstown, O.

* * *

Charles D. Hitz, assistant purchasing agent of the steel department, Pennsylvania railroad, died suddenly at his home in Haddonfield, N. J., recently at the age of 42.

* * *

Louis R. Stille, junior partner and works manager, Battis Bros. Boiler Co., Oshkosh, Wis., died March 7 at the age of 60. He was born in Oshkosh and when 15 joined the Battis company, becoming half owner of the business in 1906 upon the death of M. T. Battis, Sr.

* * *

W. S. Burt, secretary, Pacific Coast Steel Co., Seattle, died at his home there March 7, aged 65. Mr. Burt formerly lived at Youngstown, O., and was associated with Judge E. M. Wilson, president, Pacific Coast Steel Co., since the initial plant was installed at Lakeville, Wash., in 1895.

* * *

M. Maximillian, 55, special railroad representative of the Chicago Pneumatic Tool Co., New York, died unexpectedly at Richmond, Va., March 9. Mr. Maximillian had been on the sales staff of the Pneumatic Tool company for many years, formerly as Seattle district manager.

* * *

Jeptha H. Wade, president and one of the largest stockholders in the Montreal Mining Co., a subsidiary of the Oglebay-Norton Co., Cleveland, since its formation in 1894, died March 6 at his winter home in Thomasville, Ga. Mr. Wade was a prominent Cleveland citizen, well known for philanthropic work. He also had a large interest in and many years ago was vice president of the Cleveland-Cliffs Iron Co., Cleveland. Mr. Wade, in addition, was a director of the Sandusky Cement Co., the Cleveland Stone Co., the Grasselli Chemical Co. and the National Refining Co., all of Cleveland.

Convention Calendar

April 6-8—American Oil Burner association. Annual convention and exposition, Book-Cadillac hotel, Detroit. Office of secretary, 350 Madison avenue, New York.

April 15-16—National Metal Trades association. Twenty-eighth annual convention, Hotel Astor, New York. J. E. Nyhan, Peoples Gas building, Chicago, secretary.

April 21-23—American Welding society. Annual meeting at Engineering Societies building, New York. Miss M. M. Kelly, 29 West Thirty-ninth street, New York, secretary.

April 22-24—American Electrochemical society. Meeting, Chicago Beach hotel, Chicago. Colin G. Fink, Columbia university, New York, secretary.

April 28-30—National Foreign Trade council. Thirteenth annual convention, Francis Marion hotel, Charleston, S. C. O. K. Davis, India house, 1 Hanover square, New York, secretary.

May 10-15—Association of Chemical Equipment Manufacturers Inc. Second chemical equipment and process engineering exposition, Public hall, Cleveland. Roberts Everett, 1328 Broadway, New York, secretary.

May 13-15—American Gear Manufacturers' association. Annual meeting at Book-Cadillac hotel, Detroit. T. W. Owen, 2443 Prospect avenue, Cleveland, secretary.

May 17-21—National Association of Sheet and Tin Plate Manufacturers. Fourth annual meeting at Hotel Greenbrier, White Sulphur Springs, W. Va. Walter W. Lower, 421 Oliver building, Pittsburgh, secretary.

May 17-22—American Supply and Machinery Manufacturers' association. Annual convention at Hotel Statler, St. Louis. F. D. Mitchell, 1819 Broadway, New York, secretary.

May 18-20—Southern Supply and Machinery Dealers' association. Annual convention at St. Louis. Alvin M. Smith, Richmond, Va., secretary treasurer.

May 20-21—American Society for Steel Treating. Spring sectional meeting, Hotel Bond, Hartford, Conn. W. H. Eisenman, 4600 Prospect avenue, Cleveland, secretary.

June 7-10—Association of Iron and Steel Electrical Engineers. Twenty-second annual convention and exposition at Hotel Sherman, Chicago. John F. Kelly, 513 Empire building, Pittsburgh, secretary.

June 9-12—National Association of Purchasing Agents. Eleventh annual convention and exposition, Ambassador hotel and Auditorium, Los Angeles. W. L. Chandler, Woolworth building, New York, secretary.

June 16-18—Society of Industrial Engineers. Thirteenth national convention, Bellevue-Stratford hotel, Philadelphia. George C. Dent, 608 South Dearborn street, Chicago, executive secretary.

June 21-25—American Institute of Electrical Engineers. Annual convention at White Sulphur Springs, W .Va. F. L. Hutchison, 29 West Thirty-ninth street, New York, secretary.

British Market in Lull

(*Concluded from Page* 729)

more inquiries are forthcoming from railways in the British Dominions. Inquiries are out for a contract for Egypt for 1000 wagons, a useful order which Birmingham builders are hopeful will ultimately come here. There is increasing evidence that the home railways are decidedly short of rolling stock, and this is now coming home to the steel trade directly, as the lack of bolster wagons, the exceptionally long vehicles required for the conveyance of certain classes of steel, is delaying transport rather seriously in some cases.

The few remaining works left in the iron trade have difficulty in maintaining operations, largely through the competition of Belgian No. 3 iron, extensively used in the manufacture of nuts and bolts. Since Charleroi works restarted, moderately speedy deliveries can be got of this material. Belgian iron costs £6 15s ($32.80) delivered against the Staffordshire price of £10 10s ($51.03), an awkward economic difference which applies a degree of compulsion to a large proportion of the nut and bolt trade. Makers are increasingly substituting steel for iron.

Continental finished products are coming in cheaply, £5 ($24.30) for tested joists f. o. b. Antwerp, with steel bars and angles at £5 6s ($25.75) being typical quotations. There is no longer any talk of higher continental prices, and with continental demand for steel products slack, buyers are looking for reduction. German competition is also more in evidence. An important exception to the rule is the comparative scarcity of offers relative to semifinished steel which, it is said, the foreign makers are becoming tired of offering at unprofitable prices. The few obtainable are quoted at £5 10s ($26.73) against the English figure of £6 ($29.16) and are therefore scarcely competitive.

The tin plate trade shows a little improvement, the demand, however, being chiefly for certain specified sizes, which keep a number of the mills busy. A fairly good output is maintained and there are numerous inquiries, but the new business booked will not replace the production and order books are not satisfactory. On the whole, the effect of the output regulation scheme has been disappointing, especially in the matter of market tone and prices. The general figure is 19s 6d ($4.74) but a few makers are selling at 3d ($0.06) below this figure. A suggestion has been made that the scale should be revised in the matter of the datum output on which payments into the pool are based, with a view to the further reduction of output. Tin bars of British manufacture still cost £6 5s ($30.37) as against £5 5s ($25.51) for foreign.

The galvanized sheet business shows definite improvement, with mills assured of work until the end of March. The basis of £16 ($77.76) remains, but an increasing proportion of business is done at higher prices up to £16 5s ($78.97). South America and the Far East are in the market with fairly good contracts, but demand from elsewhere is steady. In South Wales, the orders are chiefly for thicker gages but Scotland is busy on thinner productions from 24 gage upward, and the mills have several months work in progress.

Steel scrap is selling a little more freely on the basis of £3 10s ($17.01) delivered South Wales.

French Producers Sell Sparingly

PARIS, March 7.—(*European Staff Service*) Prices of French metallurgical products continue to rise slowly. Another increase in the price of reparations coke is to be made March 1. According to reports, the new price will be 168 francs ($6.29) per metric ton. This will make a total increase of 27 francs ($1.00) per ton since Jan. 1. Blast furnace operators have announced their intention to increase the price of phosphorus pig iron 12.50 francs ($0.42) per ton March 1 in keeping with the rising cost of combustibles. This will bring the price of basic bessemer No. 3, 2.50 to 3 per cent silicon, to 407.50 francs ($15.17) per metric ton f. o. b. furnace. Prices of semiphosphorus pig iron, semifinished steel and finished steel products will be advanced proportionately. Business is good. Furnaces and mills are refusing orders in veiw of the instability of the political and financial situation.

Exports of semifinished steel and merchant bars during January totaled 185,940 tons, compared with 143,458 tons during January, 1925. Exports of rails during January amounted to 19,781 tons. In fact, exports of French metallurgical products are at the highest point ever reached. This is due in part to the low value of the franc, but one must not lose sight of the fact that France is bound to remain a serious factor in foreign markets with the facilities she now possesses for producing iron and steel.

Shipments of semifinished steel products to foreign destinations are heavy. England is buying basic bessemer blooms in France. Prices for export average as follows:—basic bessemer blooms £4 1s ($19.64), billets £4 9s ($21.56), sheet bars £4 14s ($22.76), all per metric ton f. o. b. Antwerp.

Franc—$0.0375

Bar mills are booked three months ahead. The domestic demand is active, but export inquiries have fallen off. Merchant bars for domestic consumption are quoted at 670 francs ($25.12). The export price is £5 6s ($25.69). Structural shapes are offered at £4 17s to £4 17s 6d ($23.48 to $23.60), base, f.o.b. Antwerp. German mills succeeded in booking several large orders by shading the price to £4 16s 6d ($23.36). Rails for export are quoted at £5 10s ($24.45). Belgian rail makers are heavily committed and have refused business at this figure. Manufacturers of wire, nails, and other wire products are from four to six months behind with orders. Nails are quoted at 1300 francs ($48.75) per metric tons f. o. b. mill. Wire rods have been sold as high as 780 francs ($29.25) per metric ton. Pipe mills are working to capacity. Both export and domestic business has been active. Mills are now delivering galvanized pipe on orders from four to five months old.

French Ore Output Up

PARIS, March 8.—(*European Staff Service*) The ouput of iron ore in France during 1925 was 26 per cent in excess of the preceding year's production and amounted to 36,578,207 metric tons. The maximum output was reached in April with 3,581,702 tons. In December it was 3,129,843 tons. The stocks at the end of each month, which on Jan. 31 were 1,868,514 tons, reached their lowest level on June 30 with 1,651,857 tons and then rose gradually each month until Dec. 31 they reached 2,450,752 tons. The share of the department of Meurthe et Moselle, which includes the Nancy basin and about 45 per cent of the Briey basin, was 18,243,000 metric tons.

Exports of French iron ore during 1925 were 9,226.688 metric tons, compared with 12,286,877 tons in 1924. The bulk of the exports, amounting to nearly seven and a half million tons, went to the Belgo-Luxemburg Economic Union; about 750.000 tons went to Germany, over 600,000 tons to Holland. and about 230,000 tons to Great Britain.

Imports during the year were 1,238,038 metric tons, compared with 724.675 tons the preceding year. The Belgo-Luxemburg Union furnished about 720,000 tons, followed by Spain with over 200,000 tons, Tunis with about 95.000 tons, and Algeria with over 68,000 tons. The following table shows production figures and stocks at the end of the month for each month 1925, and the monthly average for the last four years, in metric tons:

Mon. ave.	production	Stocks at end of month
1922	1,752.665	.....
1923	1,935.460	.....
1924	2,416.020	.....
1925	3,048,185	.....
1925		
January	3,016,939	1,868,514
February	2,767,251	1,882,831
March	3,049,921	1,844,462
April	3,581,702	1,797,478
May	2,791,206	1,669,784
June	2,847,814	1,651,857
July	3,023,500	1,794,482
August	2,968,338	1,898,973
September	3,090,273	2,066,296
October	3,270,882	2,242,592
November	3,040,538	2,371,195
December	3,129,843	2,450,752
Total	36,578,207	

Construction and Enterprise

Concise and Timely Business Building Opportunities from the Field of Industry

Where additional information is presented, reference is made to date of issue in which previous item appeared.

ATALLA, ALA.—Compress Buckle Co., 215 Houston street, Fort Worth, Tex., J. A. Todd president is planning an addition to its plant and adding other wire devices to its line.

BESSEMER, ALA.—United States Cast Iron Pipe & Mfg. Co., Gordon Jones manager, is building a pattern shop and storage house.

LOS ANGELES—Announcement is made that the Union Iron Works has negotiated for a site of 30 acres in the Bandini industrial district and will build a plant double the size of its present works. H. G. Miller is president of the Union Iron Works.

OAKLAND, CALIF.—California Wire & Cable Co., 564 Market street, San Francisco, will build an addition to its plant here.

REDWOOD CITY, CALIF.—City is building a 1-story machine shop 25x40 feet.

SANTA ROSA, CALIF.—E. F. & H. P. Sophey, manufacturers of automobile and truck bodies, will rebuild their burned plant.

STOCKTON, CALIF.—Pacific Gas & Electric Co., 245 Market street, San Francisco, will build a machine shop 50x12 feet and a garage annex 26x72 feet.

STOCKTON, CALIF.—Frazier & Co., R. Morell, Union building, architect, is building a plant at Church and San Joaquin streets for the manufacture of sheet metal products.

VERNON, CALIF.—Southern California Iron & Steel Co., Randolph street, Los Angeles, manufacturer of steel frames, is building a 1-story plant 62 x 190 feet at 340 Slauson avenue.

HARTFORD, CONN.—A. Lurie Inc. has been formed with $50,000 capital to begin a sheet metal and builders' supplies business by A. Lurie, Frank Wenick and Frederick Banes, all of Hartford.

MERIDEN, CONN.—Mackay Fuller Co. Inc. has been formed with $100,000 capital to begin an electric motor and appliance manufacturing business by James W. Mackay, Lorenzo T. Fuller, and Ellen E. Mackay, all of Meriden.

NEW BRITAIN, CONN.—North & Judd Mfg. Co., North Main street, is rebuilding its burned annealing building.

PLAINVILLE, CONN.—Peck-Harris Mfg. Co. has been incorporated with $50,000 capital to manufacture metal stampings, flat springs and specialties and has leased a shop. D. C. Peck, president of the Peck Spring Co., is president of the company.

WATERBURY, CONN.—M. J. Daly & Sons Inc., 555 Bank street, manufacturer of valves and fittings, is building a 3-story addition 42 x 100 feet.

CHICAGO—Universal Stamping & Mfg. Co., 1925 South Western avenue, will build a 1-story plant 108x175 feet.

CHICAGO—Jewell Electrical Instrument Co., 1640 Walnut street, manufacturer of electrical measuring instruments, is building a 2-story addition 75 x 100 feet.

CHICAGO—Commonwealth Edison Co. has awarded general contract to H. VonHolst, 79 West Monroe street, for its testing laboratory in connection with its California avenue plant, two stories, 52x122 feet.

CHICAGO—Pioneer Mfg. Co., 3149 Clifton avenue, has been incorporated with $10,000 capital to manufacture hardware and automobile specialties by Nels W. Thybony, L. C. Larsen and A. Hoffman.

CHICAGO—Hub Plating Co., 32 North State street, has been incorporated with 10 shares no par value to operate a general plating business by Myrtle P. McElhaney, Raymond H. Pieper and George J. Pendleton.

CHICAGO—T. M. Nipple Mfg. Co., 11837 South Peoria street, has been incorporated to manufacture nipples by John Walter, Joseph Koch and Edward Blake. M. Walsh, 7445 Exchange avenue, is correspondent.

CHICAGO—Simplex Auto Lock Co., 2214 South Michigan avenue, has been incorporated with $1000 capital to manufacture automobile accessories by James G. Hodgkinson, John Oake Roberts and Russell F. Locke, 982 Cherry street, Winnetka, Ill.

CHICAGO—Duo Metal Piston Mfg. Co., 129 South Laflin street, has been incorporated with $25,000 capital to manufacture automobile pistons by Don J. Ingram, Anton Pondelik, L. Pondelik. Richard R. Klein, 112 West Adams street, is correspondent.

CHICAGO—Automatic Power Door Mfg. Co., 608 South Dearborn street, has been incorporated with $15,000 capital to manufacture automatic power door devices and parts by V. J. Secord, S. W. Anderson and Burton Green. Thornton & Chancellor, 1014 South Michigan boulevard, are correspondents.

CHICAGO—Electrical Engineers Equipment Co., Mid-City Trust & Savings Bank building, West Madison street, has given contract to Stone & Webster for 2-story office building 40 x 70 feet, at Division and Twenty-fifth streets, on 17-acre site. Second unit will be 1-story manufacturing building 270 x 280 feet.

CHICAGO—Package Vending Machine Co., 108 South LaSalle street, has been incorporated with 200 shares no par value to manufacture vending machines and other machinery by Irving Odell, May J. Odell and Katheleen Mahoney. Church, Haft & Robertson, 108 LaSalle street, is correspondent.

CHICAGO—Andrews-Hammond Corp., 15 East Jackson boulevard, has been incorporated to manufacture electrical, mechanical and scientific devices and instruments by Edward F. Andrews, Laurens Hammond and Fern Warren. J. Kentner, 14 East Jackson boulevard, is correspondent.

CHICAGO—National Chandelier Co. Inc., 4416 North Clark street, has been incorporated with $2000 capital to manufacture electrical motors, dynamos, fixtures and equipment by William Zimmerman, Frank Ivorson, and Helen Zimmerman. John R. Bills, 206 Washington street, Waukegan, is attorney.

CHICAGO—Interstate Accessories Corp., 146 West Twenty-seventh street, has been incorporated with 200 shares no par value to manufacture shock absorbers and anchoring devices for cable ends by J. B. Bremner, J. W. Davis and George F. Gilman. Barry & Crowley, 79 West Monroe street, are correspondents.

CHICAGO—Metal Door & Trim Co., 306 South Michigan boulevard, has been incorporated with $618,500 capital to manufacture hollow trim bronze, steel copper and other metals for door jambs, picture moldings and furniture by John D. Peterson, William A. Pease and William U. Bardwell. Loucks, Eckert & Peterson, 10 South LaSalle street, are correspondents.

JOLIET, ILL.—Bates Mfg. Co., Jackson street and Rock Island railroad, has been incorporated with 4010 shares common stock no par value to manufacture tractors, engines machinery and appliances by W. O. Bates Jr., S. J. Straus, C. C. Mitchell, E. R. Milburn.

PEKIN, ILL.—Pekin Foundry & Mfg. Co., 228 Sabelle street, has been incorporated with $5500 capital and 200 shares no par value to operate a foundry by Albert V. Martins, E. P. Kastien, Daniel P. Sommer and Albert P. George. Hunter, Page & Kavanaugh, 1101 Jefferson building, Peoria, are correspondents.

PEORIA, ILL.—Peoria Malleable Castings Co., Averyville, a suburb, L. E. Robey president, suffered damage by fire, which will be replaced immediately.

PERU, ILL.—Chamberlain Metal Weatherstrip Co., Charles H. Breding president, 1644 Lafayette street, will build an addition, two stories. General contract to Peru Construction Co.

ROCK ISLAND, ILL.—Ray Oil Heating Corp., 1067 Second avenue, has been incorporated with $25,000 capital to manufacture oil burners, equipment and accessories by John Dee, Ben A. Stewart and Kathleen Hoffman. Stewart & Klingbeil, Peoples Bank building, is correspondent.

WAUKEGAN, ILL.—Waukegan Foundry Co., A. K. Barr manager, will build a 1-story foundry 87 x 254 feet.

ANDERSON, IND—Anderson Stove Co., William Quinn manager, will build two additions, to increase production 50 per cent.

HAMMOND, IND.—Roxana Petroleum Corp., Shell building, St. Louis, I. Golder, president, is considering plans for a refining plant here to cost about $2,000,000.

MUNCIE, IND.—Warner Gear Co., Ray P. Johnson president, will build additions to increase its capacity.

WABASH, IND.—G. M. Diehl Machine Works, manufacturer of woodworking machinery, is adding 10,000 square feet to its plant to enlarge several departments and will install additional machinery.

CEDAR RAPIDS, IOWA—Cedar Rapids & Marion City Electric railroad, E. C. Allen, general manager, will begin work soon on new car barn at First street between Seventh and Eighth avenues 140x300, reinforced concrete, tracks and overhead wiring, to cost $225,000.

DES MOINES, IOWA—Wood Bros. Thresher Co., F. J. Wood president, East Twentieth and Washington street, will build a 1-story

(Continued on Page 743)

Backward Spring Dulls Market

Buyers Claim Hampered Building Curtails Buying Movement

BACKWARDNESS in weather opening for the usual spring building increase is preventing iron and steel warehouses from showing a larger gain in sales volume. Prices are steady, floor plates at New York being the only product changed. This was made to harmonize with recent mill revisions.

Although trading in the New York metropolitan warehouse market is improving, the situation is still far from active. Prices are firmer. Floor plates have been reduced to bring the market more in conformity with the mill level which recently underwent a reduction. Floor plates now are 5.25c. This is a reduction of $6 a ton.

Sheets, blue annealed in particular, have been moving out of Chicago warehouses at an accelerated rate since late February and are the most active of all products. Light section structurals are in heavier demand as building weather opens. Less fluctuation is evident in wire and nail prices in the Central West. Since March 1 there has been a slight betterment in the call for building materials at St. Louis. The protracted cold weather has had a depressing effect on distribution of seasonal goods, such as wire cloth, fencing materials, and hoops and bands, but this is causing no uneasiness as the demand is expected to develop with the arrival of spring weather.

Increase in iron and steel warehouse buying is being hindered by backward weather, Cleveland jobbers claim. Although not gaining with the usual spring impetus, tonnage being moved by jobbers is heavier than in the past months. Prices are unchanged with evidence of less shading of listed quotations.

Demand for iron and steel warehouse products at Detroit continues good with some increase noted over the first part of February. A continuation of good business is looked for during the balance of the month. Local automobile producers, who have increased their schedules over initial estimates, are large pudchasers of stocks.

Berryhill Malleable Iron Co., Evansville, Ind., has increased capital from $150,000 preferred and 7500 shares no par value to $200,000 preferred and 10,000 shares no par value.

Quotations at Cents Per Pound at Leading Market Centers

STEEL BARS

Boston	3.265c
Buffalo	3.30c
Chicago	3.00c
Cincinnati	3.30c
Cleveland	3.00c
Detroit	3.15c
Los Angeles	3.20c
New York	3.24c
Philadelphia	2.90c to 3.20c
Pittsburgh	2.90c
Portland	3.00c
San Francisco	3.30c
Seattle	3.25c
St. Louis	3.15c
St. Paul	3.25c

IRON BARS

Boston	3.265c
Buffalo	3.30c
Chicago	3.00c
Cincinnati	3.30c
Detroit	3.15c
New York	3.24c
Philadelphia	2.90c to 3.20c
St. Louis	3.25c

REINFORCING BARS

Boston	3.265c to 3.50c
Buffalo	3.30c
Chicago, billet	2.60c
Chicago, rail steel	2.00c
Cincinnati	3.30c
Cleveland	2.40c to 3.10c
Detroit	3.15c
Los Angeles, C. L.	3.05c
Los Angeles, L. C. L.	3.30c
New York	2.95c to 3.15c
Philadelphia	3.00c to 3.25c
Pittsburgh	2.50c to 2.60c
San Francisco, C. L.	3.35c
San Francisco, L. C. L.	3.80c
Seattle	3.50c
Youngstown	2.50c to 2.60c

STANDARD STRUCTURAL SHAPES

Boston	3.365c
Buffalo	3.40c
Chicago	3.10c
Cincinnati	3.40c
Cleveland	3.00c
Detroit	3.25c
Los Angeles	3.20c
New York	3.34c
Philadelphia	2.70c to 3.05c
Pittsburgh	3.00c
Portland	3.10c
San Francisco	3.30c
Seattle	3.35c
St. Louis	3.25c
St. Paul	3.35c

PLATES

Boston	3.365c
Buffalo	3.40c
Chicago	3.10c
Cincinnati	3.40c
Cleveland, ¼-inch and thicker	3.00c
Cleveland, 3/16-inch	3.225c
Detroit	3.25c
Detroit, 3/16-inch	3.45c
Los Angeles	3.20c
New York (sheared and universal)	3.34c
New York (floor)	5.25c
Philadelphia	2.70c to 3.05c
Philadelphia, 3/16-inch	2.85c to 3.20c
Pittsburgh	3.00c
Portland	3.25c
San Francisco	3.30c
Seattle	3.25c
St. Louis	3.25c
St. Paul	3.25c

NO. 10 BLUE ANNEALED SHEETS

Boston, 3/16-inch	3.915c
Buffalo	3.90c
Chicago	3.50c
Cincinnati	3.60c
Cleveland	3.25c
Detroit	3.65c
Los Angeles	3.75c
New York	3.89c
Portland	4.25c
Philadelphia	3.50c
San Francisco	3.75c
Seattle	4.50c
St. Louis	3.60c
St. Paul	3.75c

NO. 28 BLACK SHEETS

Boston	5.25c
Buffalo	4.60c
Chicago	4.10c
Cincinnati	4.55c
Cleveland	4.10c
Detroit	4.25c
Los Angeles	4.75c
New York	4.50c
Philadelphia	4.65c
Portland	5.25c
San Francisco	4.75c
Seattle	5.50c
St. Louis	4.60c
St. Paul	4.35c

NO. 28 GALVANIZED SHEETS

Boston	6.25c
Buffalo	5.90c
Chicago	5.25c
Cincinnati	5.65c
Cleveland	5.25c
Detroit	5.50c
Los Angeles (corr. 28 ga.)	6.00c
New York	5.65c
Philadelphia	5.85c
Portland	6.25c
San Francisco	6.00c
Seattle	6.50c
St. Louis	5.70c
St. Paul	5.60c

BANDS

Boston	4.015c
Buffalo	4.05c
Chicago	3.65c
Cincinnati	3.95c
Cleveland	3.65c
Detroit	3.80c
Los Angeles	4.05c
New York	3.99c
Philadelphia	3.75c to 3.90c
Pittsburgh	3.60c
Portland	4.25c
San Francisco	4.15c
Seattle	4.25c
St. Paul	3.90c

HOOPS

Boston	5.50c
Buffalo	4.05c
Chicago	4.15c
Cleveland	3.65c
Detroit	4.30c
New York	4.49c
Philadelphia	4.00c to 4.25c
Pittsburgh	3.60c
Seattle	5.00c
St. Paul	4.40c

COLD FINISHED STEEL

	Rounds and hexagons	Flats and squares
Boston	4.05c	4.55c
Buffalo	3.90c	4.45c
Chicago	3.60c	4.10c
Cincinnati	3.85c	4.35c
Cleveland	3.90c	4.40c
Detroit	3.85c	4.25c
Los Angeles	5.25c*	.....
New York	4.00c	4.50c
Philadelphia	4.00c	4.50c
Pittsburgh	3.60c	4.10c
Portland	5.00c*	.....
San Francisco	4.25c*	.....
Seattle	5.00c*	.....
St. Paul	3.85c	.....

*Rounds only.

COLD ROLLED STRIP

Boston, .100 inch, 500 lb. lots	6.30c
Buffalo	6.35c
Chicago	6.25c
Cincinnati	7.15c
Cleveland, over 500 lb. lots	5.95c
Detroit	6.20c
New York	6.25c
Philadelphia	6.25c
Pittsburgh	6.30c

FOREIGN IRON AND STEEL

New York duty paid

Swedish, hollow drill steel	15.00c
Swedish iron bars, round	6.75c
Flats and squares	7.00c

WELDED PIPE

Discounts from warehouse. New York City

WROUGHT STEEL PIPE

	Black	Galvanized
⅛-inch butt	—23	+21
¼ to ⅜-inch butt	—36	— 3
½-inch butt	—46	—29
¾-inch butt	—51	—37
1 to 3-inch butt	—53	—39
2-inch lap	—40	—22
2½ to 6-inch lap	—43	—35
7 and 8-inch lap	—44	—17
9 and 10-inch lap	—38	—14
11 and 12-inch lap	—37	—12

WROUGHT IRON PIPE

	Black	Galvanized
¼ to ⅜-inch butt	+44%	+78%
½-inch butt	— 4	+19
¾-inch butt	—11	+ 9
1 to 1½-inch butt	—14	+ 6
2-inch lap	— 5	+14
2½-inch lap	— 9	+ 6
3 to 6-inch lap	— 3	+ 6
7 to 12-inch lap	— 3	+16

Iron and Manganese Ores and Minerals

Iron Ore

LAKE SUPERIOR ORES

Per Gross Ton Lower Lake Ports

Old range bessemer, 51½ per cent iron	$4.55
Mesabi bessemer, 51½ per cent iron	4.40
Old Range nonbessemer, 51½ per cent iron	4.40
Mesabi nonbessemer, 51½ per cent iron	4.25

EASTERN LOCAL ORES

Cents per unit delivered at Eastern Pennsylvania and New Jersey furnaces

Foundry and basic 53 to 63 per cent	9.00 to 10.50
Copper free low phosphorus 53 to 65 per cent	nominal

FOREIGN IRON ORE

Cents per unit, f.o.b. cars Atlantic ports

Spanish low phosphorus, 52 to 54 per cent	11.00 to 12.00
Algerian low phosphorus, 52 to 54 per cent	10.00 to 10.50
Riff low phosphorus, 65 to 66 per cent	9.50 to 10.00
Swedish and Norwegian low phosphorus, 68 per cent	11.00 to 11.50
Swedish foundry or basic, 66 to 68 per cent	10.00
Spanish foundry or basic, 50 to 54 per cent	8.50 to 9.50
Algerian foundry and basic, 50 to 54 per cent	9.25 to 9.75

Manganese Ore

Prices do not include duty at rate of 1 cent per pound of metallic manganese contained.

Brazilian, minimum 47 per cent.....nominal
Indian minimum 47 per cent.....nominal
Caucasian, 53 to 55 per cent.....
Washed, 42 cents c.i.f. tidewater

Fluor Spar

85 and 5 per cent grade

Washed gravel, Kentucky and Illinois mines, per net ton..	$17.50
Washed gravel, imported duty paid eastern tidewater, per net ton	17.50 to 18.25

Construction and Enterprise

(*Continued from Page* 741)

assembly building 100 x 300 feet and a loading warehouse and shed.

MARSHALLTOWN, IOWA—Fisher Governor Co., manufacturer of milling machines and steam specialties will build a plant 6x60 feet, one story.

MARSHALLTOWN, IOWA—General contract has been awarded to C. F. Reimer, Marshalltown, by the Marshall Canning Co., for 1-story 120x120 addition at Fourth avenue and May street, to cost $30,000.

SHREVEPORT, LA.—Simmons-Nusser Co., has been organized to conduct a welding and metal working shop by L. E. Simmons and E. F. Nusser.

BALTIMORE, MD.—Utility Mfg. Co., 1824 Lancaster street, manufacturer of wire products, will build a 2-story addition to increase capacity about 20 per cent.

BALTIMORE, MD.—William Hutcheson Son's Co., 212 North Holliday street, has bought a site and will build a machine shop 45x150 feet for production of screw machine products.

BALTIMORE, MD.—Rustless Iron Co. of America has been incorporated by W. E. Ahrens, Lindsay R. Henry and Lyman B. Sessen, 68 William street, New York, to build a plant at Loneys Lane and the Pennsylvania railroad.

BOSTON, MASS.—Gerstein Bros. & Cooper, West Third street, manufacturer of heating apparatus, will build a 1-story addition.

BOSTON, MASS.—Arcade Mfg. Co., electrical specialties, has been incorporated with $25,000 capital by Maurice H. Role, Roxbury, Mass., Benjamin E. Shapiro, Roxbury, Mass., and Edward M. Swartz, Roxbury, Mass.

BATTLE CREEK, MICH.—Battle Creek Bread Wrapping Machine Co., will build three 1-story units. General contract to H. V. Snyder Co.

BENTON HARBOR, MICH.—Consolidated Boiler Corp. has been incorporated with $150,000 capital to manufacture boilers by Milton E. Page, Chicago, Adolph T. Johanson and Harry V. Tutton, Benton Harbor.

CHANNING, MICH.—The local roundhouse and repair shop of the Chicago, Milwaukee & St. Paul railway were destroyed by fire March 2. Rebuilding will start immediately. The loss is estimated at $25,000.

DETROIT—Wolverine Name Plate Co. has been incorporated to manufacture name plates of various metals.

DETROIT—Abram Cement Tool Co., 3818 Grand River avenue, has been incorporated with $50,000 capital to manufacture cement finishing tools.

DETROIT—Detroit Die & Tool Co., 248 West Congress street, C. D. Buell president, will build a 1-story plant at Highland park, 120x120 feet.

DETROIT—Gratiot Machine Tool & Mfg. Co. has been incorporated with $50,000 capital to operate a foundry and deal in machinery by John W. Fox, Harry E. Gaygen and Willard A. Shuman, 3520 Gratiot avenue, Detroit.

GRAND HAVEN, MICH.—Grand Haven Brass Foundry, 618 Lafayette avenue, A. E. Jacobson, manager, is planning an addition, two stories.

HOUGHTON, MICH.—Michigan College of Mines, C. Carson, president, is planning a machine shop and equipment, estimated to cost $60,000.

JACKSON, MICH.—Reynolds Spring Co., will build an addition 100 x 272 feet.

JACKSON, MICH.—Teer Wickwire & Co. have been incorporated with $60,000 capital to manufacture general and special machinery and parts by J. Sterling Wickwire, Leland S. Bisbee and Donald M. Teer, 206 Second street.

KALAMAZOO, MICH.—Kalamazoo Stove Co. will build an addition to its plant with 20,000 square feet floor space.

KALAMAZOO, MICH.—Kalamazoo Retinning Co. has been incorporated with $2000 capital to retin and repair milk cans by Huston G. Hays, Chicago, Foster L. Sherwood and Leon D. Sherwood, 412 Maple street, Kalamazoo.

MARINE CITY, MICH.—Marine City Motor Castings Co., George E. Kramer president, is building an addition 35 x 65 feet.

MUSKEGON, MICH.—The Piston Ring Co. is having plans made for a 4-story plant 122x125 feet.

MUSKEGON, MICH.—Shaw-Walker Co., metal and wood filing cabinets and furniture, will build a 5-story addition 80x200 feet. L. B. Walker is secretary.

PONTIAC, MICH.—Pontiac Pattern & Engineering Co., is planning a plant addition.

FARIBAULT, MINN.—Northern States Power Co., 15 South Fifth street, Minneapolis, is having plans made by F. W. Freese, architect 38 S. Dearborn street, Chicago, for reinforced concrete and steel gas plant to cost $115,000.

FAIRMONT, MINN.—Bids will be received by H. J. Waite, secretary of the water and light commission, until March 15, for a 1000-gallon per minute, a 1500-gallon per minute and a 2500-gallon per minute motor driven centrifugal pumps. Charles Foster, Duluth, is the engineer.

HOPKINS, MINN.—Contract for structural steel has been let to the American Bridge Co., 629 South East Second street, Minneapolis, for a 2-story, 60x100, steel and concrete factory for the Minneapolis Threshing Machine Co., to cost $100,000. C. F. Haglin & Sons Co., 226 Lumber Exchange, Minneapolis, are the contractors.

LESUEUR, MINN.—Bids are being taken by J. A. Morgan, city clerk, until March 19, for material for 5½ miles of electric line including No. 6 hard drawn bare copper wire and 30-foot long 6-inch tip poles double butt treated.

MANKATO, MINN.—Bids will be received by F. W. Bates, city clerk, until March 29, for 1,000,000-gallon capacity reinforced concrete reservoir. L. P. Wolff, 903 Globe building, St. Paul, is engineer.

MINNEAPOLIS, MINN.—The Jordan Machine Tool Co., will build a 1-story 70x110 factory building at Eighteenth avenue and East Twenty-Eighth street, to cost $20,000. C. J. Bard, 413 National building, is the architetc.

MINNEAPOLIS, MINN.—Chicago, Milwaukee & St. Paul railroad, will build steel and concrete bridge over Mississippi river between Minnehaha park in Minneapolis and new Ford plant in St. Paul, to cost $1,500,000.

MINNEAPOLIS, MINN.—Hallet & Carey Co., has awarded a general contract to the McKenzie-Hague Co., 1502 Nicolett avenue, Minneapolis, for grain elevator at Elm street and Fifteenth avenue S. E., including 16 steel and concrete tanks, to cost $300,000.

MINNEAPOLIS, MINN.—Bids will soon be taken by the Upper Mississippi Barge Line Corp., S. S. Thorpe, chairman, for construction of 30 barges and three towboats to be operated on the upper Mississippi river by the Inland Waterways Corp., a government agency. Plans being made by Cox & Stevens, naval engineers, New York, and T. B. Tarn, naval architect, Pittsburgh.

ROCHESTER, MINN.—City has awarded contract to Allis-Chalmers Mfg. Co., for three transformers for high line between power dam north of city and municipal electric light plant, at cost of $5875.

ROCHESTER, MINN.—All bids taken Feb. 23 on central power plant have been rejected and project will be postponed until 1927, to cost $200,000. Harold H. Crawford, Rochester, is architect, and Frank Tustison Co., Minneapolis, engineers.

ST. PAUL, MINN.—Northern Pacific rail-

Industrial Business Changes

INTERSTATE FOUNDRY SPECIALTIES CORP. has moved its New York offices from 248 Fulton street to 461 Fourth avenue at the corner of Thirty-first. The company is controlled by S. H. Cleland and E. Kahl, and conducts the New York City offices of the New York & Pennsylvania Clay Products Co., with headquarters in Rochester, N. Y., and plant at Hutchins, Pa.; the H. E. Mills Mfg. Co., Syracuse, N. Y., manufacturer of pitch core compounds, and the Plum Point Molding Sand Co., of Maryland.

* * *

Ziv Steel & Wire Co. has removed from 4413 West Kinzie street, Chicago, to 2645 West Harrison street.

* * *

Central Steel Co., Massillon, O., has opened a district sales office at 404 West First street, Tulsa, Okla., in charge of L. S. Allen.

* * *

Per Mo Lum Castings Co., Buffalo, N. Y., has changed its name to Metal Mold Castings Co.

* * *

Bethlehem Steel Co. has removed its office at Los Angeles from the Washington building to 922 Pacific Finance building.

* * *

Pittsburgh Reinforced Brazing & Machine Co., manufacturer of valves and fittings, has changed its name to Kerotest Mfg. Co.

* * *

Wakefield Mfg. Co., Wakefield, Mass., is the new name of the George E. Belcher Machine Co., North avenue.

* * *

Rockford Milling Machine Co., Rockford, Ill., has appointed the Cleveland Duplex Machinery Co., Cleveland, sales representative for its lathes.

* * *

Pulmosan Safety Equipment Corp., Brooklyn, N. Y., has moved from 45 Willoughby street to 386 Jay street, to obtain larger quarters.

* * *

Rockford Tool Co., Rockford, Ill., has appointed the Seifreat-Elstad Machinery Co., Dayton, Columbus and Cincinnati, O., its representative in those cities.

* * *

Hemco Electrical Mfg. Co., Long Island City, N. Y., has bought a plant at Bridgeport, Conn., and will move its business and equipment there.

* * *

Aluminum Co. of America, Oliver building, Pittsburgh, has rented larger quarters in the Smithfield building, Smithfield street and Sixth avenue, and will remove there shortly.

* * *

Bridgeman Co., 120 South Thirtieth street, Baltimore, Md., has bought the plant of Cuyler & Mohler, Key highway, and will continue the business without change.

* * *

Mica Spark Plug Co., 1968 Cabot street, Detroit, is the corporate title of a company organized to take over the business formerly a partnership and build a new plant.

* * *

L. F. Grammes & Sons Inc., Allentown, Pa., manufacturer of metal specialties and name plates, has removed its New York office from the Fisk building to 25 West Forty-third street, to obtain larger quarters.

* * *

Thomas C. Olson Co., Madison, Wis., has been organized to take over the machine shop and foundry business of Thomas C. Olson, 609 East Washington avenue. No change will be made in management or policies.

* * *

The Standard Pattern Works, Rockford, Ill., doing a general jobbing business, has changed hands but there will be no change in the character of the business. E. R. Wilkinson is now president and H. C. McNeil vice president.

* * *

Climax Engineering Co., Clinton, Iowa, has appointed H. Y. Smith Co., 1301 First National Bank building, Milwaukee, A. K. Miller Engineering Co., 112 North Water street, Mobile, Ala., and L. H. Staley, 515 Whitney building, New Orleans, agents for its engines in their several territories.

* * *

Industrial Works, Bay City, Mich., has opened a branch office in the Monadnock building, San Francisco. Harvey L. Livingston, formerly with Norman B. Livermore Co., has been appointed manager for California and Arizona.

* * *

Kingsbury, Mfg. Co., Keene, N. H., manufacturer of automatic drilling machinery, has appointed the Syracuse Supply Co., its representative in Buffalo, Rochester and Syracuse territory and the Milholland Sales & Engineering Co., Indianapolis, for Indiana.

* * *

Harnischfeger Corp., Milwaukee, Wis., has appointed the William H. Hale Co., 607 Fifth avenue, South, Minneapolis, Minn., agent in Minnesota for its products. It also has appointed the Clark-Wilcox Co., 17 Lafayette street, New Haven, Conn., and 786 Albany street, Boston, its agent in New England, succeeding the K. B. Noble Co., Hartford, Conn.

* * *

Bond Foundry & Machine Co., Manheim, Pa., has appointed W. B. Yost, 37 Hermosa street, Long Beach, Calif., in the sale of power transmission machinery roller bearings and other specialties. Mr. Yost also represents the Charles Bond Co., 617 Arch street, Philadelphia, manufacturer of stock gears and couplings, and Christiana Machine Co., Christiana, Pa., water turbines.

* * *

A. C. Bisgood, dealer in new and used machinery and equipment, formally has taken over the property of the Gledhill Machinery Co., 21 Union Square, Bridgeport, Conn. Mr. Bisgood will carry a full line of lathes, drills, motors, belting pulleys, presses, shapers, etc. A 1926 model of a toolmaker's lathe is on exhibition with one of 30 years ago, showing development and progress.

road, Fifth and Jackson streets, St. Paul, will include the following improvements during 1926: relaying 260 miles of track, $3,500,000; bridges, $1,000,000; shops, machinery and tools, $150,000; tracks, sidings, yards and other items, $5,000,000.

KANSAS CITY, MO.—Western Welding Equipment Co. has been incorporated by C. W. Burns, Scarritt building.

KANSAS CITY, MO.—Western Welding Equipment Co. has been incorporated by E. A. Reid and C. W. Burns, 2115 East Thirty-sixth street.

ST. LOUIS—St. Louis Machine Tool Co. has been incorporated by Jacob Wissler, 3852 Lucky street.

ST. LOUIS—Monarch Compressor Corp. has been incorporated to manufacture refrigerating machinery by C. D. Lukens, 4908 Laclede avenue.

ST. LOUIS—Riley Hauk & Son, 201 South First street, has been incorporated to manufacture ice cream machinery by B. Riley Hauk.

ST. LOUIS—Emerson Electric Mfg. Co., King L. Parker vice president, 2018 Washington street, has leased additional space and will double its production of electric fans and small motors.

LINCOLN, NEB.—Logan-Jones Motor Co., will build a 2-story 50x100 fireproof garage at Seventeenth and P streets to cost $50,000.

CAMDEN, N. J.—The American Brown-Boveri Electric Corp. has purchased a 10-acre site in St. Louis and will soon take bids on a $1,000,000 transformer plant.

CAMDEN, N. J.—Freeman Universal Oil Burner Co. has been incorporated with 1000 shares no par value to manufacture combustion devices by Herbert F. Freeman, Florence G. Freeman, Collingswood, N. J. and Robert H. Freeman, Merchantsville, N. J. Carr & Carroll, Camden, are attorneys.

HILLSIDE, N. J.—Monitor Car & Body Co., has been incorporated with 3500 shares no par value to manufacture automobile bodies by Clyde E. Murray, Charles E. Maier, Albert P. Taliferro Jr., Richard E. Weldon, New York, is attorney.

LEBANON, N. J.—Excel Foundries has been incorporated to manufacture iron castings, grinding mills and crushers.

MILLVILLE, N. J.—Fire recently caused $30,000 damage at the plant of the Madden Iron Foundry. Plans for rebuilding have not been announced.

NEWARK, N. J.—Newark Pattern Works has been incorporated with $125,000 capital to produce castings and forgings by Henry L. Rubovitz, Newark; Charles E. Rubovitz, Irvington and Gussie R. Kabot, Bolleville. W. Eugene Turton, Newark, is attorney.

NEWARK, N. J.—The Irvington, N. J., property of the W. N. Best Corp., manufacturer of oil heaters, has been purchased by George Lambert, Newark, who has organized a lithographing company. The plot is 100 x 200 feet, a substantial part of which is covered by a 1-story brick factory building.

NEWARK, N. J.—Property has been purchased at Roselle, N. J., near here, by the Rapid Addressing Machine Co., for a 1-story brick factory building, covering 50,000 square feet, for the manufacture of addressing machines and allied equipment and will be ready for occupancy July 1.

NORTH BERGEN, N. J.—Atlantic Tank & Barrel Corp., Grand avenue and Fourteenth street, Hoboken, N. J., will build a 1-story plant 120x180 feet.

ROSELLE, N. J.—Rapid Addressing Machine Co., T. D. Adams, president, 46 West Twenty-third street, is considering erection of a 1-story plant.

Refractories

FIRE CLAY BRICK
Per 1000 f.o.b. works

Pennsylvania, No. 1	$43.00 to 45.00
Pennsylvania, No. 2	35.00 to 40.00
Ohio, No. 1	43.00 to 46.00
Ohio, No. 2	38.00 to 40.00
Illinois, No. 1	40.00 to 43.00
Illinois, No. 2	35.00 to 38.00
Kentucky, No. 1	43.00 to 45.00
Kentucky, No. 2	40.00 to 43.00
Missouri, No. 1	43.00 to 46.00
Missouri, No. 2	35.00 to 38.00
Maryland, No. 1	43.00 to 47.00
Maryland, No. 2	39.00 to 42.00

SILICA BRICK

Pennsylvania	40.00
Chicago	49.00
Birmingham	48.00 to 52.00

MAGNESITE BRICK
Per Net Ton Seaboard Base

9 x 4½ x 2½	65.00

CHROME BRICK
(Per Net Ton)

9 x 4½ x 2½	45.00 to 48.00

WEST ORANGE, N. J.—Newark Steel Post Co., has been incorporated to manufacture steel with $25,000 capital.

BROOKLYN, N. Y.—Kalten Machine Works, 59 Academy street, Jersey City, N. J., will build a plant extension, one story, 80 x 100 feet. H. J. Nurick, 44 Court street, Brooklyn, making plans.

BROOKLYN, N. Y.—Hamsley Iron Works has been incorporated with $25,000 capital by M. F. Hamsley, C. L. Hamsley and L. B. Hamsley. M. G. Jenkins, 16 Liberty street, New York, is attorney.

BUFFALO—Republic Metalware Co., 90 Alabama street, C. W. Wells, president, is making extensive alterations to its 3-story plant 52 x 104 feet.

JAMESTOWN, N. Y.—Art Metal Construction Co., H. K. Smith president, Jones street and Gifford avenue, is building a 3-story addition 50x114 feet.

MASSENA, N. Y.—The United States Aluminum Co. has closed structural steel for an addition, to the American Bridge Co.

NEW YORK—Benedict Metal Works Inc., 1654 Webster avenue, drawn metal products, will build a 3-story addition.

NEW YORK—Simon Sheft has been incorporated with $15,000 capital by Simon Sheft and F. Sheft. S. G. Wolodaver, 175 Fifth avenue, is attorney.

NEW YORK—DeLuxe Electric Lighter Co. has been incorporated with $150,000 capital by H. B. Smith, J. L. Smith and C. P. Braun. Schol & Kinkel, Buffalo, are attorneys.

NEW YORK—Lehigh Scrap Iron & Metal Co., has been incorporated with $6000 capital by S. Swerdloff, M. Goldberg and C. Goldberg. N. Frank, 299 Broadway, is attorney.

NEW YORK—Zenith Machine Co., has been incorporated with $5000 capital by J. Reinberg. and H. Reinberg, M. B. Cushner, 17 Madison avenue, is attorney.

NEW YORK—Reed Oil Burner Corp., has been incorporated with $10,000 capital by C. Reed, and E. Liebersen. A. E. Shepard, 128 West Thirty-first street, is attorney.

NEW YORK—Subway Steel Agency has been incorporated with 1000 shares no par value to handle steel products by J. F. Quayle, H. M. Wise and J. H. O'Connell. Lee, Smith & Wise, 7 Dey street, are attorneys.

NEW YORK—Hercules Corrugated Products Co. has been incorporated with $20,000 capital by D. Albert, M. Albert and A. Berkowitz. S. L. Wallerstein, 220 Broadway, is attorney.

NEW YORK—Presto Lock Corp. has been incorporated with $100,000 capital to manufacture locks by M. M. Geot, L. Offerman and A. Levine. S. Silinski, 277 Broadway, is attorney.

NEW YORK—Champion Slicing Machine Corp. has been incorporated with 1000 shares at $100 each and 500 common no par value by W. E. Gibbs, and T. J. Coyle. A. T. Wells, 41 East Forty-second street, is attorney.

NEW YORK—Frank Schmidt Machine & Mfg. Co. has been incorporated with $5000 capital to manufacture wagon loaders by F. Schmidt, H. First and E. Lasner. C. S. M. First, 220 West Forty-second street, is attorney.

NEW YORK—Shippers Car Line Corp. has been incorporated with 24,000 shares at $100 each and 100,000 shares common no par value by N. A. Stancliffe, W. F. McDermott and J. L. Farrell. Hardy, Stancliffe & Whitaker, 165 Broadway, are attorneys.

NEW YORK—Gifford Heat Control Systems has been incorporated with $100,000 capital to manufacture heat control devices by J. S. Gifford, W. L. Bryant and J. M. Donnelly. Williamson & Bayles, 115 Broadway, are attorneys.

NEW YORK CITY—A 7-story, 100 x 166-foot warehouse will be erected at Eleventh avenue and Fifty-eighth streetby the Goodyear Tire & Rubber Co. Inc. The building will be of reinforced concrete, and the Barney-Ahlers Construction Corp., general contractor, will be in charge.

OLEAN, N. Y.—The Pennsylvania railroad has placed a steel contract with the American Bridge Co. for shop additions here.

OSWEGO, N. Y.—Otis Sawyer Foundry & Machine Works, William Sawyer manager, East Ninth street, is rebuilding its burned machine shop one story, 30x60 and 66x163 feet.

ROCHESTER, N. Y.—Stromberg Carlson Telephone Mfg. Co., W. R. McCanne president and general manager, 1060 University avenue, is taking bids for a 1-story addition 160x460 feet.

BISMARCK, N. D.—The Consolidated Utilities Co., Bismarck, a new incorporation, will improve gas plants at Bismarck and Valley City, to cost $110,000. Senator Frank E. Ployhar, Valley City, is president.

AKRON, O.—Akron Foundry Co. has been incorporated with $25,000 capital by John J. Criswell, William E. Woodward, Julius Hofmann, Karl T. Wright and Pete Venys.

CANTON, O.—Hardware Specialty Mfg. Co. has been incorporated with $20,000 capital by M. M. Moore, Lew B. Motz, E. L. Gohman, Frank S. Crawford and H. S. Ernst.

CINCINNATI, O.—Cincinnati Mfg. Co., A. H. Shoenberger president, has let general contract to H. C. Hazen Co., Florence avenue and Reading road for a 5-story addition 59 x 74 feet and 25 x 30 feet.

CLEVELAND—Steel Improvement & Forge Co., C. H. Smith, president, 5603 Windsor avenue, is considering erection of a plant.

CLEVELAND—Shields Machine Co. has been incorporated with 500 shares no par value by C. S. Shields, S. S. Shields, J. H. T. Miller, Vee Carroll and Blanche Hollander.

CLEVELAND—Owen Bucket Co., Rockefeller building, has bought an acre site at West Sixty-fifth street and the New York Central tracks on which a plant will be

erected, the first unit to proceed at once. The company manufactures grab buckets.

CLEVELAND—McNutt Furnace Co. has been incorporated with $25,000 capital by Maurice McNutt, C. J. Agnew, John J. Mahon, John Balukonis and James Fuller.

LIMA, O.—Lima Architectural Iron Works, William S. East president, will take bids soon on a 4-story manufacturing plant.

LIMA, O.—Ohio Steel Foundry Co., J. A. Galvin president, is considering sketches for an addition to its plant.

MARION, O.—Fairfield Engineering Co., H. B. Walker, president, manufacturers of conveyors and machinery, will build a 1-story machine shop 60x65 feet.

BRIDGEVILLE, PA.—Universal Steel Co. will build a 1-story addition 100x150 feet.

Business in Canada

CALGARY, ALTA.—The Canadian Bryan Steam Tractor Co., Ltd., has been incorporated to manufacture steam tractors, with a capital stock of $200,000, by William A. Murphy, William H. Murphy, Mary G. Murphy and others.

NELSON, B. C.—The Frechette 2-in-1 Snap Hook Co. has completed building here and is installing machinery for the manufacture of logging hooks and hooks for heavy cranes, and will build a malleable iron foundry in connection with its plant.

HARTNEY, MAN.—Town council is having plans prepared for electric plant here.

BRANTFORD, ONT.—Schultz Bros. & Co., Albion street, have the general contract for addition to the plant on Sydenham street, for the Crown Electric Mfg. Co..

GUELPH, ONT.—The Live Wire Co., manufacturers of insulated wire, etc., has purchased the property of the old Guelph Carriage Top Co., and will remodel building and install machinery for manufacture of other products. J. Godfrey Smith is manager.

GUELPH, ONT.—Alex Rae has purchased the building here formerly occupied by the White Sewing Machine Co. of Canada, and will install machinery to expand his business of carriage building and manufacturing of automobile bodies, and general blacksmithing.

HAMILTON, ONT.—The Steel Co. of Canada, Ltd., has completed plans for a $300,000 addition to its plant here. It is understood the plans include a galvanizing plant.

HAMILTON, ONT.—The Hamilton By-Product Coke Ovens, Ltd., 15 Main street east, will build addition to plant between Ottawa and Depew streets, to increase output of coke from 400 to 1000 tons per day.

HAMILTON, ONT.—The Canadian Westinghouse Co., has received an order for three 30,000-kilowatt generators and transformers at a cost of $1,250,000 for the plant of the International Paper Co., Chelsea Falls, Quebec.

KITCHENER, ONT.—The Hardy Rail Motors (Canada) Ltd., has been incorporated to manufacture railway rolling stock of all kinds with $100,000 capital stock. Provisional directors are William S. Gurton, Joseph Plint and David G. McIntosh.

LONDON, ONT.—The Kelvinator of Canada, Ltd., has been incorporated to manufacture refrigerators, with a capital stock of $800,000 and 100,000 shares of no value, by Robert Gowans, Charles D. Magee, Ernest H. Stewart, and others.

NORTH BAY, ONT.—The Nipissing Electric Supply Co., Ltd., has been incorporated to manufacture electrical apparatus and supplies, with a capital stock of $50,000. Provisional directors are Josiah W. Alger, Percy M. Chamberlin, Charles M. Sibbitt, and others.

TILLSONBURG, ONT.—Construction will begin immediately on an oil refinery here, to cost $1,000,000. The first two units, it is expected, will be in operation by August 1. Another two units will be built within the following year. The project is being undertaken by the Regal Oil Refinery Co., Toronto.

TRENTON, ONT.—Miller Bros. Paper Co., Ltd., Glen Miller, Ont., propose to build a dam and power plant here.

COATICOOK, QUE.—The Nelson River Construction Co., Ltd., Bank of Hamilton building, Toronto, Ont., has the general contract for construction of hydro power development plant here for city. The English Electric Co. of Canada, Ltd., 211 McGill street, Montreal, Que., has contract for electrical machinery.

MONTREAL, QUE.—L. Fournier, 67 Inspector street, is asking for prices on new steel round shelf boiler 6x16 feet, pressure 140 pounds, also engines.

MONTREAL, QUE.—The building occupied by by the Atlas Metal Co., and Hudson-Herbert & Co., Ltd., on De Bresoles, was destroyed by fire with loss of $140,000. Owners will rebuild.

MONTREAL, QUE.—The Attendu Engines, Ltd., has been incorporated to manufacture engines and machinery, with a capital stock of $125,000, by Colville Sinclair, Ralph Erskin Allen, John W. Long, and others.

MONTREAL, QUE.—The H. F. Clayton Corp., Ltd., has been incorporated to manufacture oil burning engines, with a capital stock of $49,000, Francis J. Laverty, Charles A. Hale, Shirley G. Dixon and others.

MONTREAL, QUE.—The Chemical Engineering Equipment Co., Ltd., has been incorporated to manufacture chemical equipment and machinery, with a capital stock of $50,000, by Francis J. Laverty, Charles A. Hale, Shirley G. Dixon and others.

SHERBROOKE, QUE.—Owing to increasing demand for power the city has decided to add another generating unit to its Weedon power plant here, bringing the capacity up to 50,000 horsepower.

New Trade Publications

INDUSTRIAL BUILDING—The Dresser Co., Cleveland, has issued a bulletin showing several industrial structures planned by its organization, indicating a wide range.

BELTING—Belts and accessories are featured in a bulletin by the Akron Belting Co., Akron, O., giving various grades for varied uses. It is illustrated by representations of fastenings, clamps and attachments.

POWER DRIVE—A self-contained unit, portable and capable of being connected with various tools, containing a motor and chuck, is described and illustrated in a bulletin by the Borden Co., Warren, O.

EXCAVATORS AND DREDGES—Hayward Co., New York, has issued a bulletin featuring its skid excavators and dredges, with many illustrations of the various pieces of apparatus and of a large range of uses.

CUTTER AND TOOL GRINDER—Gallmeyer & Livingston Co., Grand Rapids, Mich., has issued a bulletin describing its universal cutter and tool grinder, as redesigned for self-contained motor drive.

WINDOW WASHING SYSTEMS—The Cleveland Crane & Engineering Co., Wickliffe, O., has issued a folder showing a window washing cage suspended from a rail around the upper part of the building. The cage may be moved longitudinally and vertically.

SURFACE GRINDERS—Bulletins giving details of construction and operation of 14-inch and 22-inch vertical surface grinders are being sent out by the Pratt & Whitney Co., Hartford, Conn. The machines are of new design and embody a number of radical changes.

DRY GRINDING—A bulletin by the Ransom Mfg. Co., Oshkosh, Wis., describes its motor driven dry grinding machines, ball bearing, equipped with speed controller. It is possible with this equipment to maintain a constant periphery speed until the wheel is worn to the flange.

ELECTRIC DRILLS AND REAMERS—Hisey-Wolf Machine Co., Cincinnati, has issued a catalog showing its line of portable electric tools, including drills, reamers screw drivers, radial drills, drilling stands, grinding and buffing machines with full information as to sizes and capacity.

TWIST DRILL GRINDER—Keystone Grinder & Mfg. Co., Pittsburgh, has issued a bulletin describing its motor driven grinder for redressing twist drills. It is devised so that perfect results may be obtained by inexperienced operators. Various features are given detailed description.

OVEN FURNACE—Accomplishment of carbonizing, hardening and annealing without a forced air blast is described in a bulletin by the Johnson Gas Appliance Co., Cedar Rapids, Iowa, describing its oven furnace. A new size has been put on the market with features that simplify its use.

CO_2 RECORDER—A motor-driven CO_2 recorder as an aid to economy in combustion is featured in a bulletin by the Republic Flow Meters Co., Chicago. This was developed to avoid difficulties sometimes resulting from bad water supply for the hydraulic drive formerly used.

PULVERIZED FUEL BURNERS—Combustion Engineering Corp., New York, in a catalog just issued, describes its unit system for installation in small plants. In this system coal is pulverized and fed directly to the furnace instead of being stored and drawn on as needed. The catalog covers all features of such installations.

HANDLING EQUIPMENT—A catalog of standard filing size, with reference tab attached, featuring the trucks and tiering machines manufactured by the Lewis-Shepard Co., Boston, is an attractive current publication. It is amply illustrated to show details of construction and varied uses of the several pieces of apparatus.

ZINC PIGMENT—New Jersey Zinc Co., New York, recently issued a 26-page booklet in which the use of metallic zinc powder as a paint pigment is described. The bulletin goes into some detail regarding the use of zinc powder and it is pointed out that while tests conducted by the company, on which the data in the bulletin are based, are not complete and final, results so far have been so favorable as to warrant publication of the practical information and formulas obtained. A history of the use of zinc dust as a paint pigment is given, and the scope of the tests conducted by the company is outlined in considerable detail.

MANSFIELD *Automobile Sheets*

Mansfield Automobile Sheets are especially suited to meet the most exacting specifications of manufacturers—because of the close supervision they receive from competent metallurgists throughout every production process.

Scientific treatment of the metal in the open-hearth furnace and the distinctive Mansfield method of pouring results in ingots that are exceptionally pure—low in sulphur and free from "pipes", seams, etc.

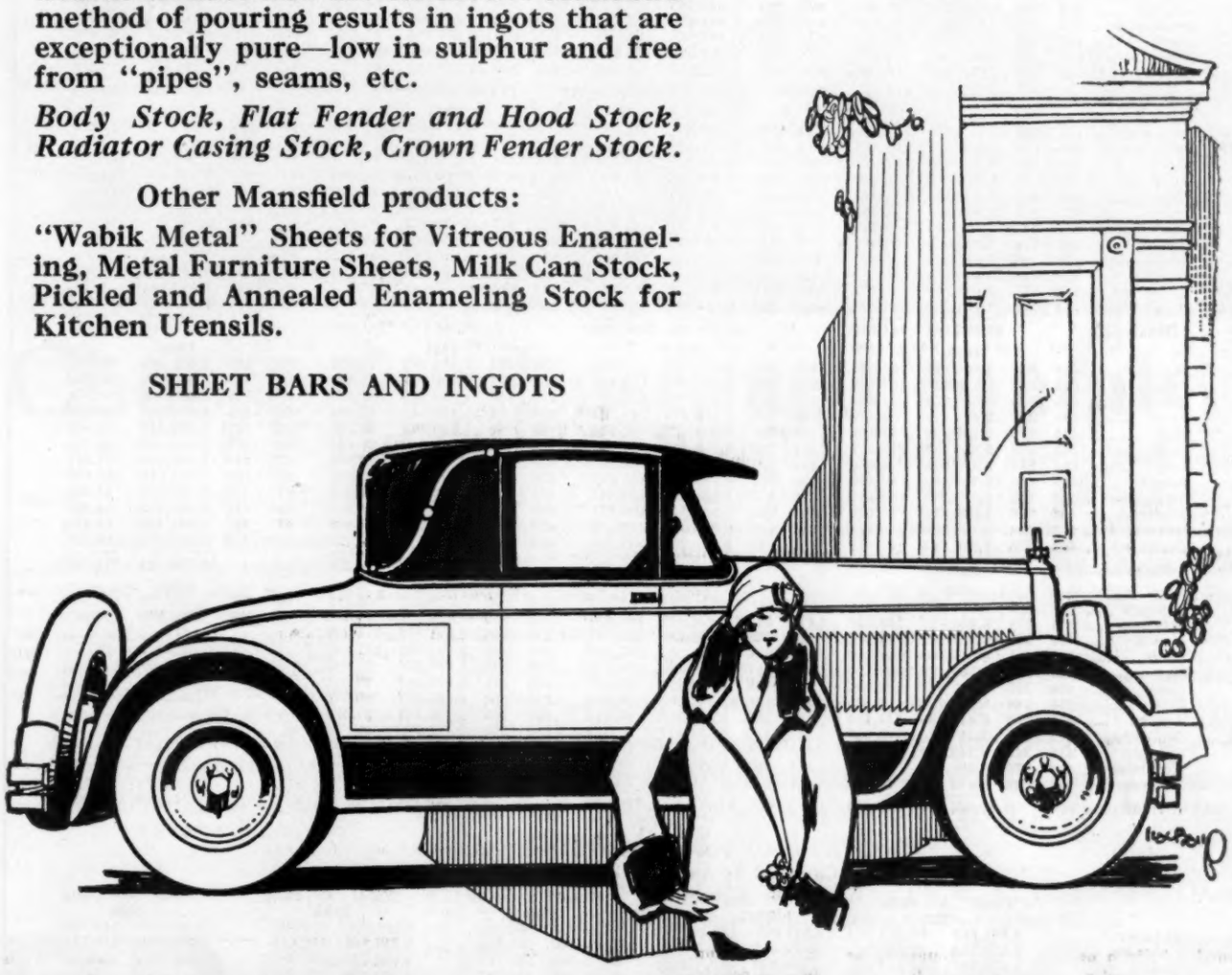
Body Stock, Flat Fender and Hood Stock, Radiator Casing Stock, Crown Fender Stock.

Other Mansfield products:

"Wabik Metal" Sheets for Vitreous Enameling, Metal Furniture Sheets, Milk Can Stock, Pickled and Annealed Enameling Stock for Kitchen Utensils.

SHEET BARS AND INGOTS

"Quality of unusually high character"



Mansfield Sheet & Tin Plate Company
Mansfield, Ohio

District Sales Offices:

12-237 General Motors Bldg., Detroit, Mich.
1372 Wrigley Bldg., Chicago, Ill.
410 Pierce Bldg., St. Louis, Mo.
1106 National City Bldg., New York, N. Y.
2002 Union Trust Bldg., Cleveland, Ohio
1504 West Venango Street, Philadelphia, Pa.

Contributing Member
SHEET STEEL
TRADE EXTENSION COMMITTEE

District Sales Offices:

1403 Merchants Bank Bldg., Indianapolis, Ind.
1020 Union Trust Bldg., Cincinnati, Ohio
640 Endicott Bldg., St. Paul, Minn.
237 Rialto Bldg., San Francisco, Calif.
509 Wilcox Bldg., Los Angeles, Calif.
1426 L. C. Smith Bldg., Seattle, Wash.

Iron and Steel Production

IN GROSS TONS

Pig Iron

Compiled by IRON TRADE REVIEW

	—Stacks— No.	In	——Output—— Total	Av. daily	—Stacks— No.	In	——Output—— Total	Av. daily	—Stacks— No.	In	——Output—— Total	Av. daily	—Stacks— No.	In	——Output—— Total	Av. daily
	1907				1908				1909				1910			
January	376	311	2,174,801	70,155	398	139	1,081,813	34,897	406	234	1,787,473	57,683	416	311	2,599,995	83,871
February	374	308	2,047,036	73,109	401	150	1,086,809	37,476	407	233	1,682,470	60,088	417	311	2,429,525	86,765
March	377	304	2,186,709	70,539	398	154	1,229,856	39,672	406	229	1,822,024	58,793	417	310	2,588,736	83,508
April	378	327	2,226,708	74,223	398	146	1,155,122	38,504	406	224	1,731,406	57,687	418	291	2,477,700	82,590
May	391	329	2,291,030	73,904	396	145	1,168,002	37,677	407	236	1,866,757	60,218	419	279	2,374,802	76,607
June	392	341	2,237,420	74,580	395	154	1,106,300	36,876	408	240	1,929,929	64,334	420	271	2,288,279	76,276
July	396	335	2,253,243	72,685	397	166	1,228,604	39,632	409	258	2,088,620	67,375	420	254	2,158,124	69,617
August	397	329	2,243,656	72,376	399	181	1,366,019	44,065	412	278	2,232,642	72,021	422	244	2,103,791	67,864
September	399	329	2,174,148	72,471	399	189	1,416,252	47,208	413	297	2,378,655	79,201	420	234	2,048,461	68,282
October	401	314	2,359,690	76,119	400	200	1,573,824	50,764	413	309	2,589,681	83,538	421	230	2,086,205	67,297
November	398	226	1,820,558	60,685	402	212	1,582,314	52,744	414	311	2,532,740	84,425	421	218	1,910,385	63,679
December	398	154	1,234,733	39,830	403	221	1,723,664	55,602	416	314	2,682,702	86,539	421	193	1,779,899	57,416
Total			25,249,732	*69,177			15,718,579	*42,947			25,325,099	*69,383			26,845,902	*73,550
	1911				1912				1913				1914			
January	421	210	1,766,658	56,985	421	227	2,052,806	66,220	423	297	2,787,800	89,929	423	199	1,879,336	60,624
February	421	226	1,781,285	63,617	422	285	2,098,796	72,372	423	306	2,578,670	92,095	423	219	1,888,607	67,450
March	421	236	2,165,764	69,863	420	237	2,411,529	77,791	423	278	2,762,823	89,123	423	232	2,341,551	75,534
April	421	220	2,044,904	68,163	421	239	2,377,621	79,254	421	297	2,754,353	91,812	422	212	2,261,501	75,383
May	421	206	1,871,388	60,367	423	243	2,503,341	80,753	421	285	2,816,825	90,865	422	198	2,097,019	67,646
June	421	202	1,773,282	59,109	424	242	2,433,737	81,125	422	283	2,616,883	87,229	422	193	1,904,566	63,486
July	423	196	1,776,108	57,294	422	245	2,402,567	77,502	422	264	2,558,275	82,525	422	187	1,955,324	63,075
August	423	206	1,921,832	61,995	423	255	2,500,163	80,650	424	260	2,537,018	81,839	422	187	1,996,483	64,403
September	423	216	1,973,918	65,797	419	262	2,444,454	81,482	425	258	2,494,098	83,137	422	180	1,882,718	62,757
October	421	214	2,092,061	67,486	422	280	2,683,645	86,569	425	244	2,539,924	81,933	422	162	1,767,227	57,007
November	421	214	1,999,100	66,637	423	289	2,639,562	87,985	424	225	2,229,960	74,322	421	150	1,501,269	50,042
December	422	215	2,082,301	65,558	423	291	2,777,292	89,590	424	191	1,976,138	63,746	421	154	1,495,325	48,236
Total			23,198,601	*63,558			29,325,513	*80,124			30,652,767	*83,980			22,970,926	*62,934
	1915				1916				1917				1918			
January	421	165	1,591,024	51,323	421	304	3,171,878	102,319	422	310	3,159,839	101,930	435	294	2,403,227	77,523
February	421	179	1,666,592	59,521	421	312	3,078,548	106,157	422	317	2,649,935	94,641	435	319	2,318,242	82,723
March	421	190	2,046,280	66,009	422	315	3,327,630	107,343	423	331	3,255,813	105,026	438	338	3,209,996	103,548
April	421	197	2,114,518	70,484	422	320	3,225,496	107,517	425	333	3,328,061	110,936	437	351	3,273,355	109,112
May	421	207	2,255,157	72,747	423	321	3,364,584	108,535	425	340	3,413,677	110,119	437	360	3,451,884	111,351
June	421	221	2,369,932	78,998	423	325	3,213,818	107,127	427	347	3,260,234	108,675	437	353	3,316,148	110,538
July	421	234	2,563,311	82,687	419	316	3,221,127	103,907	429	351	3,337,442	107,659	437	364	3,408,584	109,954
August	421	246	2,774,825	89,510	419	317	3,197,838	103,156	431	357	3,238,970	104,483	439	371	3,378,479	108,983
September	420	266	2,834,342	94,478	419	326	3,208,041	106,935	431	342	3,140,742	104,691	438	364	3,413,223	113,774
October	420	276	3,120,340	100,656	419	328	3,508,180	113,167	433	354	3,296,286	106,332	437	364	3,482,392	112,335
November	421	285	3,035,235	101,174	420	322	3,317,805	110,593	434	344	3,198,597	106,620	437	360	3,347,844	111,595
December	421	295	3,201,605	103,278	422	309	3,184,178	102,715	435	321	2,885,380	93,077	435	351	3,434,114	110,778
Total			29,573,161	*81,022			39,019,123	*106,609			38,164,976	*104,561			38,437,488	*105,308
	1919				1920				1921				1922			
January	435	330	3,306,279	106,654	432	285	3,012,373	97,172	436	184	2,414,753	77,895	430	127	1,645,804	53,090
February	435	311	2,943,347	105,120	432	305	2,984,257	102,904	436	155	1,929,394	68,906	429	139	1,630,180	58,220
March	435	279	3,088,023	99,614	433	315	3,375,768	108,895	436	103	1,594,866	51,447	429	155	2,035,908	65,674
April	435	216	2,474,374	82,479	433	278	2,752,670	91,754	436	96	1,190,751	39,691	429	161	2,070,161	69,005
May	433	197	2,107,729	67,991	433	297	2,991,825	96,510	436	90	1,215,272	39,202	427	175	2,309,348	74,495
June	433	199	2,114,028	70,467	433	302	3,046,623	101,553	436	74	1,064,007	35,466	427	191	2,362,455	78,748
July	434	240	2,424,212	78,200	434	291	3,043,918	98,190	435	69	864,642	27,892	427	170	2,403,030	77,517
August	432	266	2,742,081	88,453	434	306	3,145,536	101,468	436	69	954,901	30,802	427	143	1,810,665	58,408
September	433	163	2,480,790	82,692	434	317	3,124,308	104,143	435	84	985,795	32,859	427	189	2,024,008	67,466
October	432	216	1,864,424	60,142	435	290	3,288,341	106,075	435	95	1,234,450	39,821	428	218	2,629,655	84,827
November	432	252	2,407,369	80,244	435	255	2,935,081	97,836	429	120	1,414,958	47,165	428	241	2,846,110	94,870
December	432	262	2,626,074	84,711	435	202	2,700,268	87,105	429	123	1,642,775	52,992	428	253	3,083,520	99,468
Total			30,578,730	*83,777			36,400,968	*99,456			16,506,564	*45,223			26,850,844	*73,563
	1923				1924				1925				1926			
January	428	261	3,228,226	104,136	414	248	3,015,480	97,273	411	251	3,372,207	108,781	385	225	3,319,789	107,089
February	424	278	2,993,918	106,925	414	263	3,073,619	105,987	411	256	3,214,067	114,788	382	223	2,923,850	104,423
March	424	295	3,523,595	113,664	410	269	3,465,389	111,787	410	246	3,571,422	115,207			.....	.....
April	423	311	3,546,308	118,210	410	234	3,226,107	107,537	409	221	3,211,235	107,041			.....	.....
May	423	322	3,868,486	124,790	411	187	2,619,986	84,515	405	196	2,933,907	94,642			.....	.....
June	424	322	3,667,868	122,262	411	158	2,022,836	67,427	399	191	2,679,045	89,301			.....	.....
July	418	299	3,684,677	118,860	411	145	1,783,457	57,531	396	188	2,665,262	85,976			.....	.....
August	418	270	3,448,886	111,254	411	150	1,882,986	60,741	391	192	2,707,171	87,328			.....	.....
September	418	254	3,117,526	103,917	411	174	2,053,617	68,454	387	200	2,725,885	90,862			.....	.....
October	418	245	3,142,642	101,375	411	204	2,514,979	83,832	386	209	3,017,889	97,351			.....	.....
November	418	229	2,891,191	96,373	411	229	2,956,389	95,367	385	220	3,023,257	100,775			.....	.....
December	418	231	2,912,527	93,952	411	229	2,956,389	95,367	385	234	3,249,057	104,808			.....	.....
Total			40,025,850	*109,659			31,076,572	*84,908			36,370,404	*99,645			6,243,639	105,824

Steel Ingots

Compiled by American Iron and Steel Institute

	Total	Av. daily	Total	Av. daily	Total	Av. daily	Total	Av. daily	Total	Av. Daily
	1922		1923		1924		1925		1926	
January	1,891,857	72,764	3,841,095	142,263	3,649,913	135,182	4,198,564	155,502	4,153,545	159,752
February	2,071,772	86,324	3,471,843	144,660	3,826,246	153,050	3,756,243	156,510	3,795,139	158,131
March	2,814,667	104,247	4,066,680	150,618	4,206,699	161,796	4,198,520	161,482	.....	.....
April	2,902,240	116,090	3,963,736	158,549	3,348,466	128,787	3,587,524	137,982	.....	.....
May	3,218,794	119,215	4,216,355	156,161	2,640,034	97,779	3,458,253	133,010	.....	.....
June	3,127,775	120,299	3,767,256	144,894	2,065,676	82,627	3,207,056	123,348	.....	.....
July	2,952,806	118,112	3,531,458	141,258	1,877,789	72,223	3,087,590	118,753	.....	.....
August	2,629,256	97,380	3,695,788	136,881	2,552,891	98,188	3,424,034	131,694	.....	.....
September	2,818,261	108,395	3,356,776	134,271	2,827,625	108,755	3,492,904	134,342	.....	.....
October	3,410,265	131,164	3,577,091	132,485	3,125,418	115,756	3,893,028	144,186	.....	.....
November	3,430,309	131,935	3,134,321	120,551	3,121,149	124,846	3,907,437	156,297	.....	.....
December	3,300,416	132,617	2,863,266	114,531	3,569,251	137,279	3,975,824	152,916	.....	.....
Total	34,568,418	*111,511	43,485,665	*139,825	36,811,157	*117,984	44,186,977	142,080	7,948,684	*158,974

*Average.

Choose for Lasting Economy

As builders of locomotive cranes, creeper cranes and gas shovel cranes, each equipped to handle all kinds of materials, we are in a position to fit your job with a crane that will give you the best service at the lowest possible cost.

Write for a copy of our Catalog K.

When selecting a crane for your handling work, look into the future a few years and ask yourself this question—will the crane I buy still be saving money for me after a few years use? If you follow in the footsteps of the thousands of Brownhoist crane users, you will be enjoying the profits that come from sturdy, well built equipment.

When you buy a Brownhoist crane you get a machine backed by over 45 years of crane building experience. One that is well known throughout the world for its excellence of design, years of trouble-free service and unexcelled economy. Many 25-year old Brownhoist cranes are still in use and giving good service to their owners.

The Brown Hoisting Machinery Co., *Cleveland, Ohio*

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans.

BROWNHOIST

GOOD MATERIAL HANDLING MACHINERY

Discounts and Extras

Steel Pipe

Pittsburgh and Lorain basing discounts, jobber's carloads.

Evanston, Ill., and Indiana Harbor, Ind., take differential 2 points less discount of $4 per ton higher net.

Chicago takes differential 2½ points less than Pittsburgh-Lorain basis or $5 per ton higher net.

Butt Weld

	Black	Galvanized
⅛-inch	45	19½
¼ and ⅜-inch	51	25½
½-inch	46	42½
¾-inch	60	48½
1 to 3-inch	62	50½

Lap Weld

2-inch	55	43½
2½ to 6-inch	59	47½
7 to 8-inch	56	43½
9 and 10-inch	54	41½
11 and 12-inch	53	40½

REAMED AND DRIFTED

Butt Weld

1 to 3-inch	60	48½

Lap Weld

2-inch	53	41½
2½ to 6-inch	57	45½

EXTRA STRONG—PLAIN ENDS

Butt Weld

⅛-inch	41	24½
¼ and ⅜-inch	47	30½
½-inch	53	42½
¾-inch	58	47½
1 to 1½-inch	60	49½
2 to 3-inch	61	50½

Lap Weld

2-inch	53	42½
2½ to 4-inch	57	46½
4½ to 6-inch	56	45½
7 to 8-inch	52	39½
9 and 10-inch	45	32½
11 and 12-inch	44	31½

DOUBLE EXTRA STRONG

Butt Weld

½-inch	42	12½
¾ to 1½-inch	45	35½
2 to 2½-inch	47	37½

Lap Weld

2-inch	41	32½
2½ to 4-inch	43	34½
4½ to 6-inch	42	33½
7 to 8-inch	33	25½

(Note—Large jobbers obtain additional preferential discounts of 1 and 5 on black and 1½ and 5 on galvanized.)

Wrought Iron Pipe

Pittsburgh basing discounts, jobbers' carloads. Individual quotations made on delivered basis

TREADS AND COUPLINGS

Butt weld

⅛ and ¼-inch	+11	+39
⅜-inch	22	2
½-inch	28	11
¾ to 1½-inch	30	13

Lap Weld

1¼ and 1½-inch	Upon	application
2-inch	23	7
2½ to 6-inch	26	11
8 to 6-inch	28	13
7 to 12-inch	26	11

PLUGGED AND REAMED

Two points less than above

EXTRA STRONG, PLAIN ENDS

¼ and ⅜-inch	+19	+54
½-inch	21	7
¾-inch	28	12
1 to 1½-inch	30	14

Lap Weld

2-inch	23	9
2½ to 4-inch	29	15
4½ to 6-inch	28	14
7 to 8-inch	21	7
8 to 12-inch	16	2

DOUBLE EXTRA STRONG

Butt Weld

½-inch	+47½	+59½
½-inch	+28	+40
1-inch	+34	+40
1¼-inch	+28	+40
1½-inch	+27	+39

Lap Weld

2 and 2½ inches	+13	+25
3 to 4-inch	+ 8	+17
4½ to 6-inch	+ 9	+18
8-inch	+12	

(Note—Large jobbers obtain additional preferential discounts of 1, 5 and 2½ on black and galvanized.)

Boiler Tubes

Pittsburgh less carload discounts. Carload 4 points larger

STEEL (Lap Welded)

2 and 2¼-inch	23 off
2½ and 2¾-inch	33 off
3-inch	36 off
3¼ to 3¾-inch	38½ off
4 to 13-inch	42 off

(Note—Additional discounts of 5 to 7 extra 5 per cents now being given.)

CHARCOAL IRON

1½-inch	+22
1¾-inch	+12
2 and 2¼-inch	+ 2
2½ to 3-inch	3
3¼ to 4½-inch	5

(Note—Additional discounts of 2 or 3 extra 5 per cents now being given.)

SEAMLESS COLD DRAWN

1-inch	56 off
1¼ and 1½-inch	48 off
1¾-inch	32 off
2 and 2¼-inch	27 off
2½ and 2¾-inch	35 off
3-inch	41 off
3¼ and 3½-inch	43 off
4-inch	46 off
4½, 5 and 6-inch	41 off

SEAMLESS HOT ROLLED

2 and 2½-inch	30 off
2½ and 2¾-inch	38 off
3-inch	44 off
3¼ and 3½-inch	46 off
4-inch	49 off
4½, 5 and 6-inch	44 off

SEAMLESS STEEL MERCHANT BOILER TUBES

Extras:

Add $8 per ton for more than four gages heavier than standard and add 10 per cent to theoretical weight.

Add 5 per cent for lengths over 24 feet and not over 26 feet.

Smaller tubes than 1-inch and lighter than standard gage to be sold at mechanical tubing list and discount.

Intermediate sizes and gages not listed above take price of next larger outside diameter and heavier gage.

SEAMLESS STEEL MECHANICAL TUBING

Base Discounts on New List July 1, 1925

Carbon 0.10 to 0.20 per cent.....50 to 55 off

Carbon 0.30 to 0.40 per cent.....45 to 50 off

SEAMLESS STEEL LOCOMOTIVE AND SUPERHEATER TUBES

Net prices per foot f.o.b. Pittsburgh

Outside diameter	Gage	Price
2-inch	12-gage	14¼c
2-inch	11-gage	15c
2-inch	10-gage	16c
2¼-inch	12-gage	16c
2¼-inch	11gage	17c
2¼-inch	10-gage	18c
3-inch	7-gage	33c
5⅝-inch	9-gage	50c
5½-inch	9-gage	52c

Plus usual extras for forming and for long lengths over 18 feet and for commercially exact lengths.

Plate Extras

BASE

Rectangular plates, tank steel or conforming to manufacturers' Standard Specifications for structural steel, dated Nov. 24, 1922, or equivalent, ¼-inch thick and over on thinnest edge, (except for ¼-inch or 72 inches wide when ordered to weight in pounds per square foot—see width and gage extras), 100 inches wide and under, down to but not including 6 inches wide, 5 feet 0 inches long up to published limit in length but not over 80 feet 0 inch, are base. Extras per pound for width or diameter.

All Plates, Rectangular or Otherwise

¼-inch thick and heavier, but not less than 11 pounds per square foot, if ordered to weigh—

Over 100 inches to and including 110 inches	.05c
Over 110 inches to and including 115 inches	.10c
Over 115 inches to and including 120 inches	.15c
Over 120 inches to and including 125 inches	.25c
Over 125 inches to and including 128 inches	.50c
Plates less than ¼-inch or lighter than 11 pounds per square foot.	
Over 72 inches to and including 84 inches	.10c
Over 84 inches to and including 96 inches	.20c
Over 96 inches to and including 100 inches	.30c
Over 100 inches add .35c to width extras for plates ¼-inch thick and heavier.	

GAGE

Plates not Exceeding 72 inches Wide

Plates less than ¼-inch gage, to and including $\frac{7}{16}$-inch; or lighter than 10.2 pounds per square foot to and including 7.65 pounds per square foot ..... .20c

Plates Over 72 Inches Wide

Plates less than ¼-inch gage, to and including $\frac{7}{16}$ inch; or lighter than 11 pounds per square foot, to but not including 7.65 pounds per square foot ..... .20c

Plates ordered 7.65 pounds per square foot ..... .30c

QUALITIES

Pressing steel	.10c
Flange steel (boiler grade)	.15c
Ordinary firebox steel	.20c
Stillbottom steel	.30c
Locomotive firebox steel	.50c
Marine steel	1.50c
Hull material subject to U. S. Navy Dept. Specifications for Medium or Soft Steel	.10c
High tensile hull steel subject to U. S. Navy Dept. or equivalent specifications	1.00c
Boiler steel subject to U. S. Navy Dept. Specifications, classes A and B	1.50c
Hull plates to hull specifications, required to stand cold flanging, take extra for flange steel.	

Floor Plates

Checkered plates 1.75c

Checkered plates are not furnished to sketch and are rolled from "Stock Steel" only. No physical tests will be made on checkered plates.

INSPECTION

Mill inspection .....No extra

Charges for other inspection, such as Lloyd's or American bureau of shipping, will be made by inspection bureau direct to buyer.

CUTTING

LENGTH OR DIAMETER

All Plates, Rectangular or Otherwise

Five feet and over up to published limit of length, but not over 80 feet....No extras

Under 5 feet to 3 feet inclusive	.10c
Under 3 feet to 2 feet inclusive	.25c
Under 2 feet to 1 foot inclusive	.50c
Under 1 foot	1.55c
Over 80 feet to 100 feet inclusive	.25c

Over 100 feet add .25c plus .05c for every additional 2 feet or fraction thereof.

Regular Sketches

With not more than four straight cuts. (including straight taper plates)

Additional extra ..... .10c

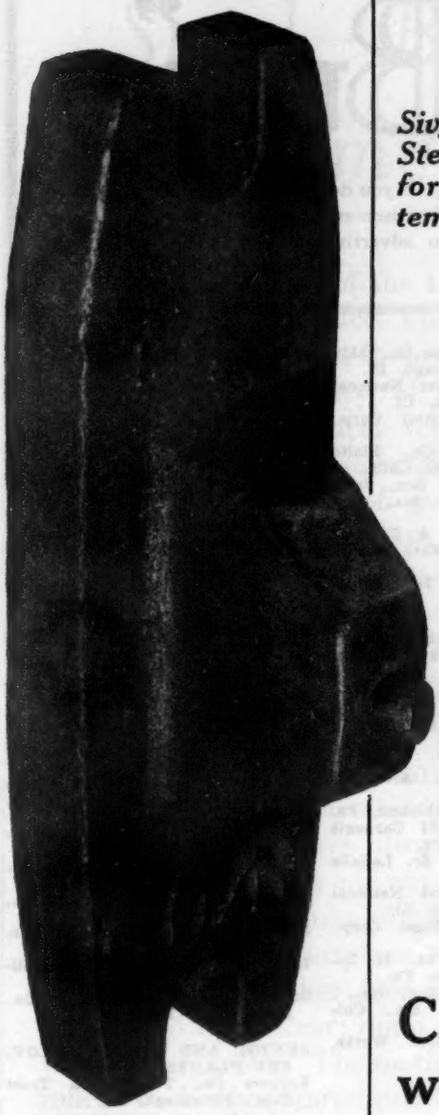
Irregular Sketches

With not more than four straight cuts. (Sketches cannot be sheared with re-entrant angles)

Additional extra ..... .20c

SIVYER (S) CASTINGS

DEPENDABLE



Sivyer Alloy Electric Steel Castings can be forged, welded and tempered.

Male and female dies, for pressing hand hole plate arches. These dies are cast in Sivyer Chrome Nickel Steel. The above unretouched pictures were taken after the dies had made more than 10,000 Impressions. This set of dies is still in service according to last reports.

Cutting Die Costs 80 Per Cent with Sivyer Cast Alloy Steel Dies

The Walsh and Weidner Boiler Company of Chattanooga, Tenn., for whom Sivyer cast the above dies, formerly used tool steel dies. Finding that their die costs were becoming excessive, they sought for new methods and metal and finally turned to Sivyer Cast Alloy Steel. They now report that this change has enabled them to cut their die costs approximately 80%. The Sivyer Dies are cast closely to finished dimensions eliminating considerable expensive machining. In addition, the Walsh and Weidner Boiler Co. report: "We have no exact record of the plates made from these dies but we estimate them to be something in excess of 10,000. We find the cost of cast steel dies not including patterns, to be about one-fifth that of tool steel dies."

Why Sivyer Alloy Steels Can Deliver Such Service
is readily seen when the physical properties of the metal in the annealed state are considered.

Physical Properties—Sivyer Chrome Nickel Electric Steel

Tensile Strength	100,000
Yield Points	65,000
Elongation in 2-inch	19%
Reduction of area	30%

Tempering after machining, by the user, makes this alloy even stronger

Machining Costs Cut One-third
In addition the dies can be cast closely to their finished shape and size. This accuracy minimizes machining one third or more, compared with the usual tool steel dies. Such an important saving is well worth any die user's notice.

SIVYER STEEL

SIVYER STEEL CASTING COMPANY, MILWAUKEE

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ACCUMULATORS
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Pennsylvania Engineering Works, New Castle, Pa.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

ACETYLENE (Dissolved)
International Oxygen Co., Newark, N. J.
Prest-O-Lite Co., The, 30 E. 42nd St., New York City.

ACETYLENE GENERATORS
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

ACETYLENE IN CYLINDERS
International Oxygen Co., Newark, N. J.
Prest-O-Lite Co., The, 30 E. 42nd St., New York City.

ACIDS (Pickling)
American Chemical Paint Co., Ambler, Pa.

ADAMITE ROLLS
American Adamite Co., The, 12th & Etna Sts., Pittsburgh, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

ALLOYS
Browne, deCourcy, Inc., 8 West 40th St., New York City
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., Niagara Falls, New York.
Vanadium Corp. of America, 120 Broadway, New York City.

ALUMINUM
Leavitt, C. W., & Co., 30 Church St., New York City.
Rogers, Brown & Crocker Bros., Inc., 21 E. 40th St., New York City.

ALUMINUM (Vanadium)
Vanadium Corp. of America, 120 Broadway, New York City.

ALUMINUM TUBING
Summerill Tubing Co., Bridgeport, Pa.

ANGLES, TEES, CHANNELS—See STEEL (Structural)

ANNEALING BOXES
Adamson Machine Co., The, Akron, Ohio.
Farrell-Cheek Steel Foundry Co., Sandusky, O.
Pittsburgh Malleable Iron Co., 34th & Smallman Sts., Pittsburgh, Pa.
Riter-Conley Co., Oliver Bldg., Pittsburgh, Pa.
Smith, George H., Steel Casting Co., Milwaukee, Wis.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.
Zanesville Malleable Co., Zanesville, Ohio.

APPRAISALS
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Champion Machine & Forging Co., The, 3675 E. 78th St., Cleveland, Ohio.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.

BALING PRESSES
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BANDS AND HOOPS (Galvanized Strips)
Sharon Steel Hoop Co., Sharon, Pa.

BANDS (Iron)
Bethlehem Steel Co., Bethlehem, Pa.

BANDS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.

BANDS (Welded Iron and Steel)
Akron-Selle Co., Akron, O.

BAR BENDERS
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., 71 Broadway, New York City.

BARRELS (Steel)
Cleveland Wire Spring Co., The, 1261 E. 38th St., Cleveland, O.

BARS (Acid Resistant)
Alcumite Corp., The, Dayton, O.

BARS (Alloy)
Central Steel Co., Massillon, O.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Wheelock, Lovejoy & Co., Inc., 128 Sidney St., Cambridge, Mass.

BARS (Concrete Reinforcements)
Bethlehem Steel Co., Bethlehem, Pa.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Franklin Steel Works, Franklin, Pa.
Gulf States Steel Co., Brown-Marx Bldg., Birmingham, Ala.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Pollak Steel Co., The, Cincinnati, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Truscon Steel Co., Youngstown, O.

BARS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., The, Milton, Pa.
Morris, Wheeler & Co., 30 th and Locust Sts., Philadelphia, Pa.
Penn Iron & Steel Co., Creighton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Truscon Steel Co., Youngstown, O.

BARS (Steel)
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Central Steel Co., Massillon, O.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Illinois Steel Warehouse Co., 1319 Wabansia Ave., Chicago, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Pacific Coast Steel Co., Rialto Bldg., San Francisco, Calif.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., 1351 Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

BARS, STEEL (Electric Furnace)
Timken Roller Bearing Co., The, Canton, Ohio.

BASKETS (Wire)
Meyers, Fred J., Mfg. Co., The, Hamilton, O.

BEAMS, CHANNELS, ANGLES, ETC.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Phoenix Iron Co., The, 20 So. 15th St., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Snead Architectural Iron Works, Louisville, Ky.

BEARINGS (Ball)
Hoover Steel Ball Co., Ann Arbor, Mich.
New Departure Mfg. Co., The, Bristol, Conn.
Norma-Hoffman Bearings Corp., Stamford, Conn.

BEARINGS (Journal)
Hyatt Roller Bearing Co., Newark, N. J.
Keystone Bronze Co., 39th St., Pittsburgh, Pa.

BEARINGS (Motor)
Hoover Steel Ball Co., Ann Arbor, Mich.
Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.

BEARINGS (Roller)
Hoover Steel Ball Co., Ann Arbor, Mich.
Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
Hoover Steel Ball Co., Ann Arbor, Mich.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Timken Roller Bearing Co., The, Canton, O.

BELT CEMENT AND DRESSING (Leather)
Williams, I. B., & Sons, Dover, N. H.

BELT LACING (Leather)
Chicago Rawhide Mfg. Co., 1305 Elston Ave., Chicago, Ill.
Williams, I. B., & Sons, Dover, N. H.

BELTING (Chain)
Link-Belt Co., 910 S. Michigan Ave., Chicago, Ill.

BELTING (Leather)
Chicago Rawhide Mfg. Co., 1305 Elston Ave., Chicago, Ill.
Williams, I. B., & Sons, Dover, N. H.

BENCHES AND FRAMES (Drawing)
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., The, Cuyahoga Falls, O.

BENDING AND STRAIGHTENING MACHINES
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland, O.
Hinman, D. A., & Co., Sandwich, Ill.
Kane & Roach, Niagara and Shonnard Sts., Syracuse, N. Y.
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Long & Allstatter Co., Hamilton, O.
Sutton-Abramsen Engineering Co., Park Bldg., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Co., The, Union Trust Bldg., Pittsburgh, Pa.

BILLETS (Forging)
Bethlehem Steel Co., Bethlehem, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.

BILLETS (Forging, Alloy Steel)
Bethlehem Steel Co., Bethlehem, Pa.

BILLETS AND BLOOMS
American Rolling Mill Co., Middletown, O.
American Tube & Stamping Co., The, Bridgeport, Conn.
Andrews Steel Co., Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Central Steel Co., The, Massillon, Ohio.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Illinois Steel Co., 208 South La Salle St., Chicago, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Interstate Iron & Steel Co., 104 S. Michigan Ave., Chicago, Ill.
Wood, Alan, Iron & Steel Co., Widener Bldg., Philadelphia, Pa.

BLANKS (Ring, Gear and Sprocket)
Akron-Selle Co., Akron, O.

BLAST FURNACES—See FURNACES (Blast)

BLOWERS
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York City.
Spencer Turbine Co., Hartford, Conn.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

Steel—Beneficent Force of American Progress!

THE first quarter of the twentieth century has run its race. For the people of the United States it has been an era of matchless prosperity, of marvelous advances in the practical sciences, of the attainment of "the comfortable life". The Bible records periods of greater spiritual discernment; the golden days of Greece and Rome were more fruitful in literature and the arts; but the pages of history may be scanned in vain for a quarter-century in which men acquired or developed more creature comforts.

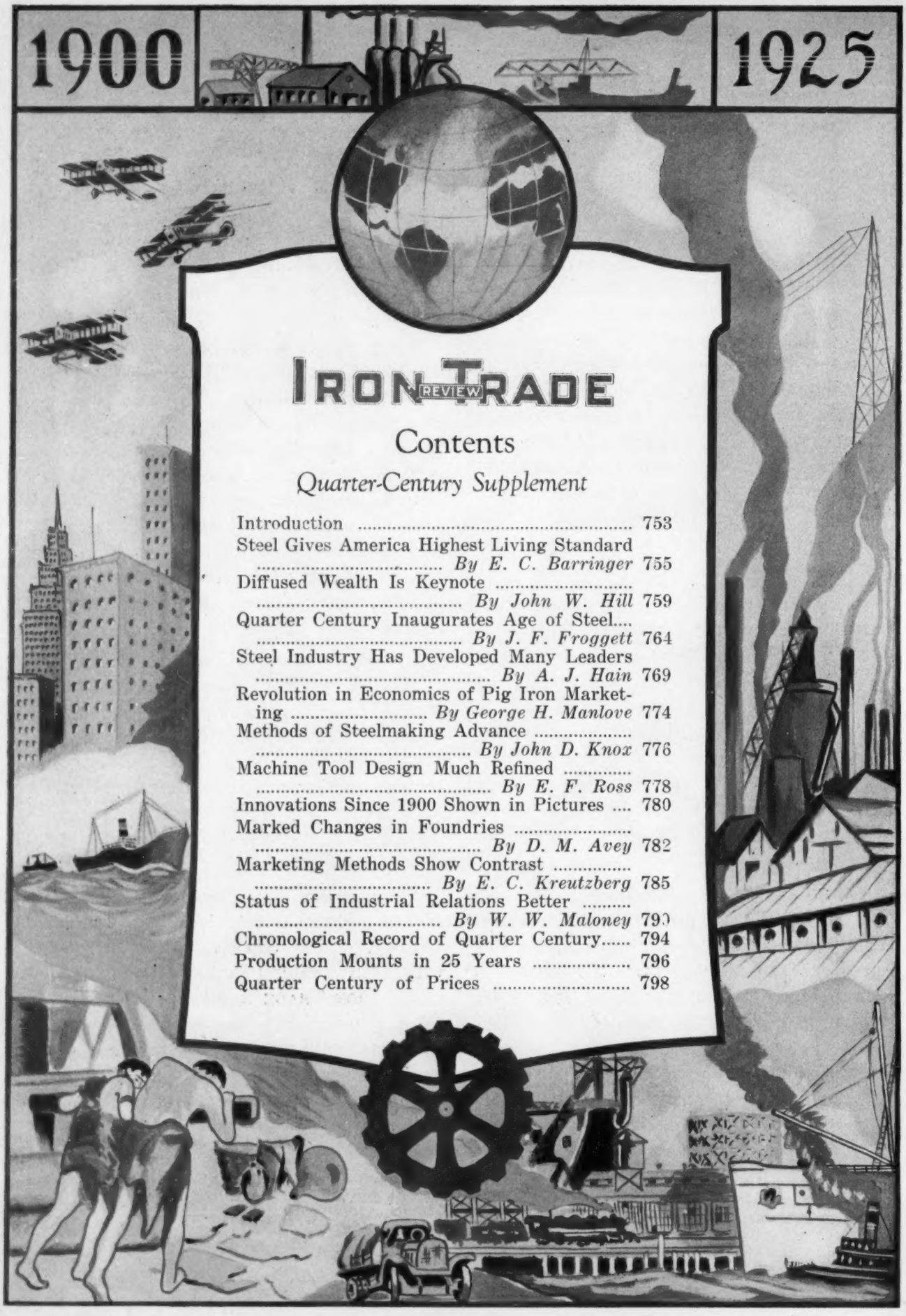
Since Eden man has been circumscribed by his senses and faculties. Beyond his restricted horizon have always lain opportunity and adventure and enjoyment; it has remained for the railroad, the automobile, the steamship, the airplane to make them his own. The ether long has vibrated, undetected by the ear; radio has magnified the auditory nerve. The motion picture has rolled back the limitations of sight and enabled man to see to the ends of the earth.

IN all ages these liberating agencies have been available and from time to time genius has reached out and apprehended their theory. But to make them the servitors of mankind to the end that life be broader and brighter has been the work of the metals—notably steel—in the past quarter century. Steel, the basis of quantity production, has made possible towering cities, giant industries, the ubiquitous automobile, leviathans of the seas, mechanical domestic helps, radio, the motion picture. Lacking these, man would be shorn of almost all that contributes to the full and comfortable life of this age. Steel is indeed a precious metal in beneficence, although base in cost and availability.

That canvas would be crowded which would attempt to depict the progress of the iron and steel industry in the past twenty-five years. Executive capacity, practice, tonnage, financing, labor relations, welfare work all have expanded beyond the expectations of the most foresighted of 1900. A host of men, some still living, have left their characteristic impress upon the industry. Witnessing the economic importance of steel, many of them have been national figures.

IN these twenty-five years IRON TRADE REVIEW has kept pace with the industry. This its present eminence attests. From its vantage point it has logged the weekly course of events. It also has served by anticipating major informative wants, and having served it has grown. IRON TRADE REVIEW properly has been in the industry but not of it.

The industry is now upon the threshold of the second quarter of the twentieth century, which conceivably is pregnant with even greater progress. It may well pause, IRON TRADE REVIEW believes, to see passing in review in the succeeding pages the personalities and events which colored and shaped the past quarter, to gain a true perspective of the advances in method and production, to assess anew the contribution of steel to the nation. And, having paused, to resume the onward march with quickened inspiration to serve humanity—which, after all, is the sum of life.



IRON TRADE REVIEW

Contents

Quarter-Century Supplement

Introduction 753
Steel Gives America Highest Living Standard ..... *By E. C. Barringer* 755
Diffused Wealth Is Keynote ..... *By John W. Hill* 759
Quarter Century Inaugurates Age of Steel.... ..... *By J. F. Froggett* 764
Steel Industry Has Developed Many Leaders ..... *By A. J. Hain* 769
Revolution in Economics of Pig Iron Marketing ..... *By George H. Manlove* 774
Methods of Steelmaking Advance ..... *By John D. Knox* 776
Machine Tool Design Much Refined ..... *By E. F. Ross* 778
Innovations Since 1900 Shown in Pictures 780
Marked Changes in Foundries ..... *By D. M. Avey* 782
Marketing Methods Show Contrast ..... *By E. C. Kreutzberg* 785
Status of Industrial Relations Better ..... *By W. W. Maloney* 790
Chronological Record of Quarter Century..... 794
Production Mounts in 25 Years 796
Quarter Century of Prices 798

Steel Raises American Standard of Living to Highest in World

1902—$1.00 a Pound

By E. C. Barringer

HISTORY does not disclose any people enjoying so high a standard of living as that of continental United States today. In some ancient nations a small aristocracy may have reached a higher state of abstract culture, but they were only a veneer over an impoverished free and slave population and lacked even the common conveniences of the present day laborer. As Secretary of Commerce Hoover has said, the United States has attained a state of material wellbeing never before known.

The automobile, radio, airplane, mechanical domestic appliances, swift and comfortable transportation by rail and water—these are some of the symbols of this enviable position. But the marvel is not that they exist; it is rather that over the past quarter century they have become available to the many, that their distribution through the body politic has been vertical and not horizontal.

For this the nation is indebted to the metals, chiefly steel. Advanced methods of manufacturing, of which mass production is outstanding, have reduced costs and created consuming markets broader than was ever conjectured, and what is manufacturing or mass production but intelligent utilization of metals? It is more than coincidence that the upbuilding of the metal producing and working industries has slightly forerun the advances toward the present-day scale of living; it is cause and effect.

Mass production must of a certainty rank as the major mechanical accomplishment of the United States in the quarter century just ended. Between it and hand processes is the difference between life in the United States and in China. Dissected, it is an agamogenetic organism. Quantity output is made possible only by low unit cost, which in turn stimulates the demand that warrants the tremendous investments required.

Over the past 25 years mechanical ingenuity has been taxed to consolidate processes, expedite operations and depress production costs to ever lower levels. American manufacturers, free of the drag of conservatism and background, have "plunged" on equipment and won. They have never hesitated to scrap serviceable machines when better were brought out. For one thing, competition has permitted no wavering. A Detroit automobile maker the other day junked body presses costing $50,000 when its engineers developed a press costing one-fifth that sum but turning out as much and better work.

1926—25 Cents a Pound

"Quantity output is made possible only by low unit cost which in turn stimulates the demand that warrants the tremendous investments required."

Probably the automobile industry affords the best by mass production. In the opening years of this century,

HERE is a typical farm before its transformation, such as shown on the opposite page. The automobile takes the farmer and his family into town at their will; the motor truck hauls the crops cheaply; the tractor does substantially all that the horse could do. Labor-saving electric equipment is used in the house and barns; and now the radio further enlightens farm life; all dependent in some way on steel.

when the industry was decidedly in its infancy. the more modestly priced automobiles were sold for approximately $1 per pound. One of the earlier cars put out by Henry Ford before he essayed quantity production weighed 2000 pounds and was quoted at so many dollars. Today the Ford 2-door sedan sells for close to 25 cents per pound. Cars in the Buick, Nash and Studebaker class retail for about 40 to 50 cents per pound. Only the Lincoln, Marmon, Locomobile, Franklin and similar cars remain in the $1 per pound category. Who will say that the cars of today are not better than those of 1900?

But reduced cost is only one facet of mass production. Distribution rather than acquisition or origination is a characteristic of it. Transportaton by self-propelled vehicles and transmission of messages by wireless had been glimpsed in some degree prior to 1900, but it remained for mass production in the past quarter century to bring the automobile and radio within the reach of practically everyone. Only 6 per cent of the world's population lives in the United States but it accounts for more than 50 per cent of the world's manufactures.

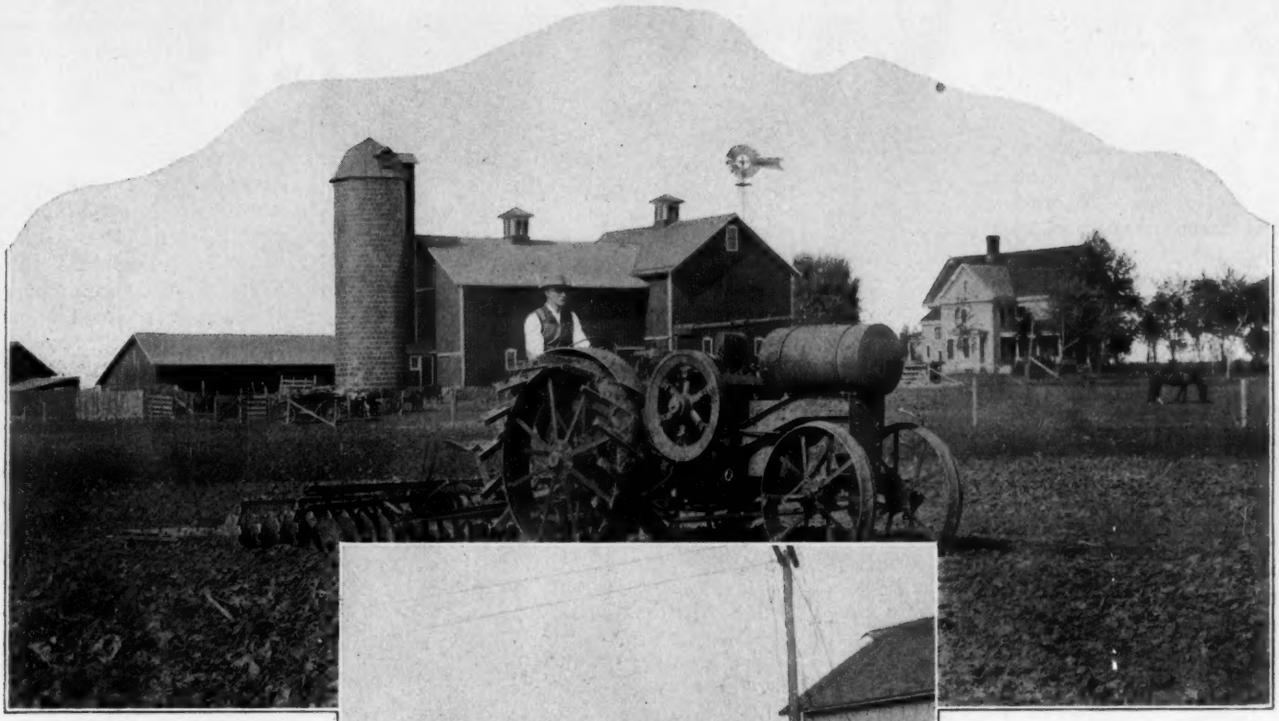
With quantity production has come a sweeping revolution in the structure of industry. The small workshop or factory, with its individual proprietor, has gradually been giving way before the competition of large combinations of capital and labor. The concentrated buying power and the economies of an integrated structure have tended to eliminate the smaller interests or force them into defensive combinations, in themselves sizable. In 1900 corporations—meaning thereby establishments larger than the one man concern—employed less than 70 per cent of all wage earners in industry, while by 1925 the percentage had come close to 90 per cent. In the wave of consolidations early in this quarter century, economies in prduction were chiefly sought in large-scale operations; now, in the recurring period of combination, cheaper selling and distribution are stressed.

In this drift toward size the personal touch between management and labor has largely disappeared. The paternal relation between proprietor and his small staff of employes has been invested with a halo and its passing universally lamented. Absentee ownership has been the peg upon which much social criticism of big business has been hung. Yet the law of reaction has tended to balance the account by bringing about a widespread distribution of corporation securities. Just as the personal proprietor of small business has passed out of the picture, so is centralized control of corporations going. Ownership is slowly filtering down through the general public, especially employes, and the average workman has a much greater stake in his industry today than he had 25 years ago. It has been estimated that one person in seven in the United States today holds stock in some form, while 25 years ago it was one in 20. One authority states about one-fourth of all stock dividends is paid to persons with incomes from $1000 to $5000 annually. Here is a phase of socialism, or peaceful penetration, beyond the Marx school.

Through the automobile mass production has made its greatest contribution to the easier life of this age. No other product or development has so affected average living conditions, and for the better. "A nation on wheels" may be a derisive comment and the solidarity of the home may sometimes seem to be threatened, yet the benefits are overwhelmingly predominant.

The transportation afforded by the automobile has unfolded suburban life and is helping to alleviate some of evils of urban congestion. The periphery of the home circle has been pushed miles out. The city goes to the country and vice versa, with a more helpful appreciation of the other's problems resulting. Minnesota goes to Florida for the winter, while Virginia summers in Maine.

The bond of national unity which the automobile has welded is of incalculable value. It was the railroad, iron and steel, which made the United



States a political possibility. History records no other instance where a nation so far flung as the United States has survived. It was lack of transportation that cut down Rome. Without the railroad it is difficult to conceive how the various sectional interests here could have been harmonized.

Had the United States been settled 200 years earlier, there doubtless would have been a vast plains nation stretching from the Alleghenies to the Rockies, with coastal nations on the Atlantic and the Pacific and possibly the Gulf. The railroad, with its expedited transportation of freight and persons and intelligence, held the nation together; now the automobile is cementing it. The cross-hauls of freight may be uneconomic but they are politically essential. Just so the automobile migrations are more than mere burning of gasoline and spending of surplus earnings; they are instruments of national harmony.

Never has any industry grown with the rapidity of the automobile. Department of commerce reports give the total production of passenger cars and trucks from 1901 to 1905 inclusive as 14,795. From 1906 to 1910 inclusive the total increased to 92,-197. In 1916 production crossed the million mark while in 1925 it was well over 4,000,000. A tribute indeed to the machine tool and assembly line!

The motorization of the farms and of industry is second only to that of the home. Despite the occasional waves of agrarian discontent, farm life has never been on so high a plane as in the United States today. The automobile takes the farmer and his family into town at their will. The motor truck hauls the crops cheaply to the railroad or the warehouse. The tractor does substantially all that a horse could. The rural free delivery carrier utilizes an automobile for his rounds.

Only in congested portions of cities is the horse holding its own against the automobile delivery truck, and there the fault lies not inherently with the truck but with its regulation. On medium distance hauling and door-to-door delivery of freight the automobile truck has put the railroad on the defensive. It seems likely that the railroad and the truck will ultimately supplement each other and the present uneconomic competition will cease.

Steel, having given the automobile aud the truck to the nation in this quarter century, has also had to give it traction. The concrete highway, reinforced with steel bars, is sequent to the automobile. The more sturdy bridges required are of structural steel or reinforced concrete. Practically all of the road signs are steel Guards at curve and other points of danger are steel wire. In the home it has been the metals, again chiefly steel, that have lightened the burden. Woman has been largely emancipated by the suction sweeper, mechanical washer, dryer and ironer, and electrical appliances for sewing and cooking. The superpower lines that are straddling the countryside on huge steel towers are bringing electricity to the farmer's door and putting the farm woman on the same mechanical footing as her city sister. Here again advanced methods of production are responsible. Costs of appliances in the first instance and electricity in the second have been brought down sufficiently to open almost every home to them.

With all this tremendous production of commodities, life has not become standardized or commonplace. The automobile has increased, not detracted from, the buying power of the country. The taste of something that brightens and eases life only whets the appetite for more. In American industry labor has not been held down to an arbitrary wage; on the contrary, it has shared with capital in the profits of more economical and expeditious production. This increased buying power has been completing the cycle by absorbing the products of industry and stimulating the search for improved methods.

How primitive would be life without the advantages contributed by improved methods of manufacturing

in the past twenty-five years. The morning newspaper would be a shadow of itself for the lack of fast running presses and its delivery would be a matter of hours because of the absence of trucks. The transportation of milk from the farms to the shipping points and to the urban distributing points would be almost impossible without trucks. Office and factory workers, lacking automobiles and motor busses, would be thrown back upon inadequate street cars, frequently horse cars, and antiquated suburban train equipment. Without the swift electric elevator the modern office building would be insufferable. In fact, the office building would be a negligible affair. Electrical domestic helps would be almost completely missing, few homes would have the wiring, plumbing and heating facilities now adjudged essential — in short, life would be unbearably hard to the present generation. But what of the future, particularly the next 25 years?

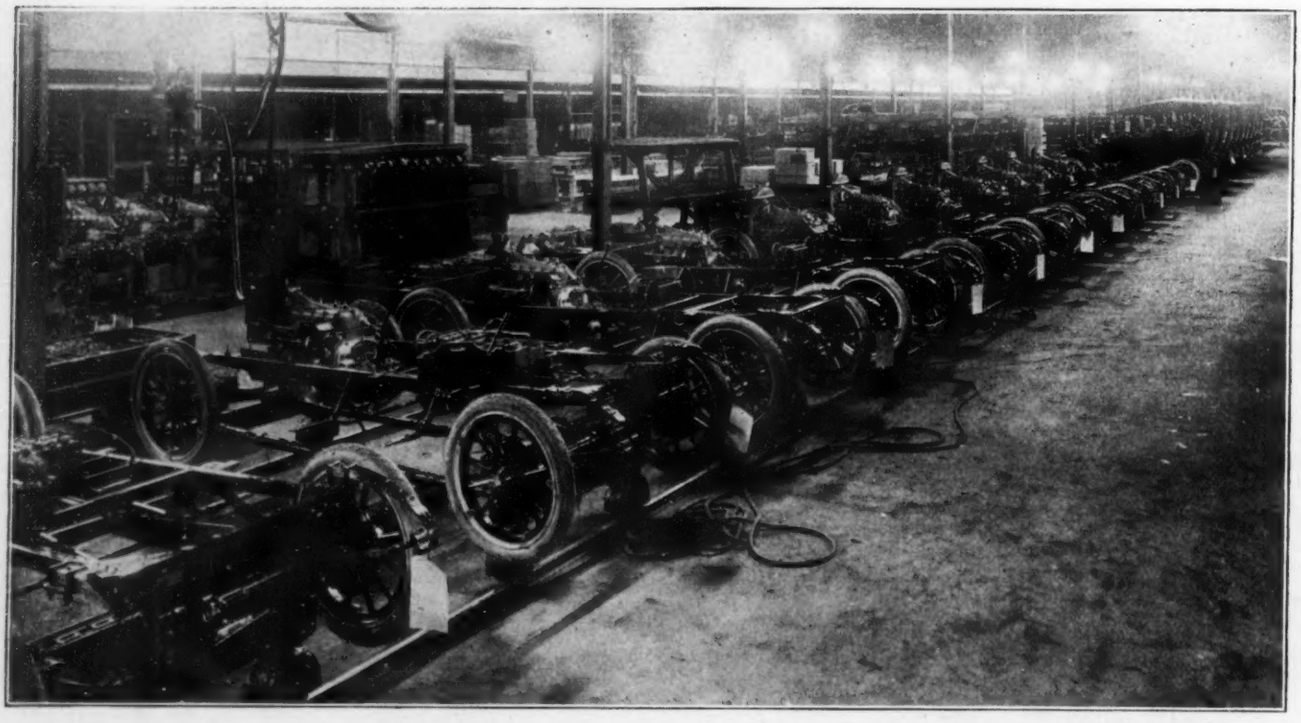
"Metals, chiefly steel, have lightened the burden"

Manufacturers will be called upon to meet many new demands created by constantly improving standards of living. It is reasonable to believe that the majority of present-day comforts are due for refinements not yet conceived by even the most visionary prophets of this generation.

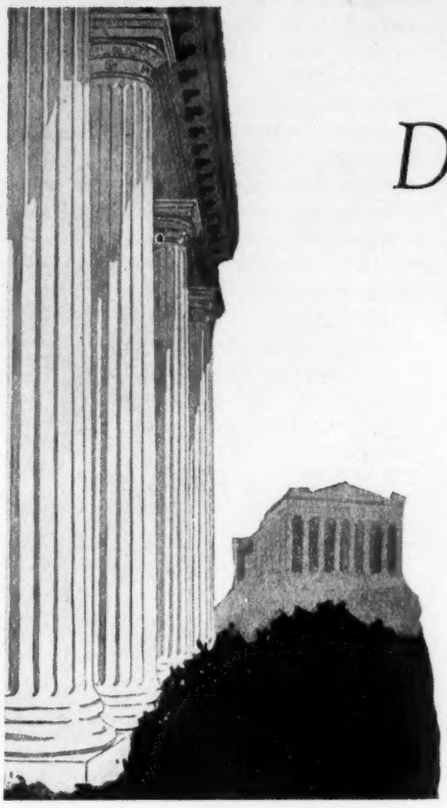
Who can tell what part industry will take in the immediate and ultimate solutions of the transportation and communication problems of the United States? Certainly the signs of revolutionary changes in railroad transportation already are in evidence. Broader acceptance of the airplane is just ahead. Possibilities of lighter-than-air craft likely will be tested more thoroughly than heretofore. Utilization of the radio in a more practical manner and further refinements in the telephone and telegraph are confidently expected.

Many sections of the country still remain undeveloped. Natural resources of untold possibilities thus far have not been tapped. Distribution of light and power to remote districts still offers a field of manifold possibilities.

Solving these and other problems constitutes a big task for the next quarter century. It means continued application of American genius for organization.



"Probably the automobile industry affords the best example of the economies effected by mass production"



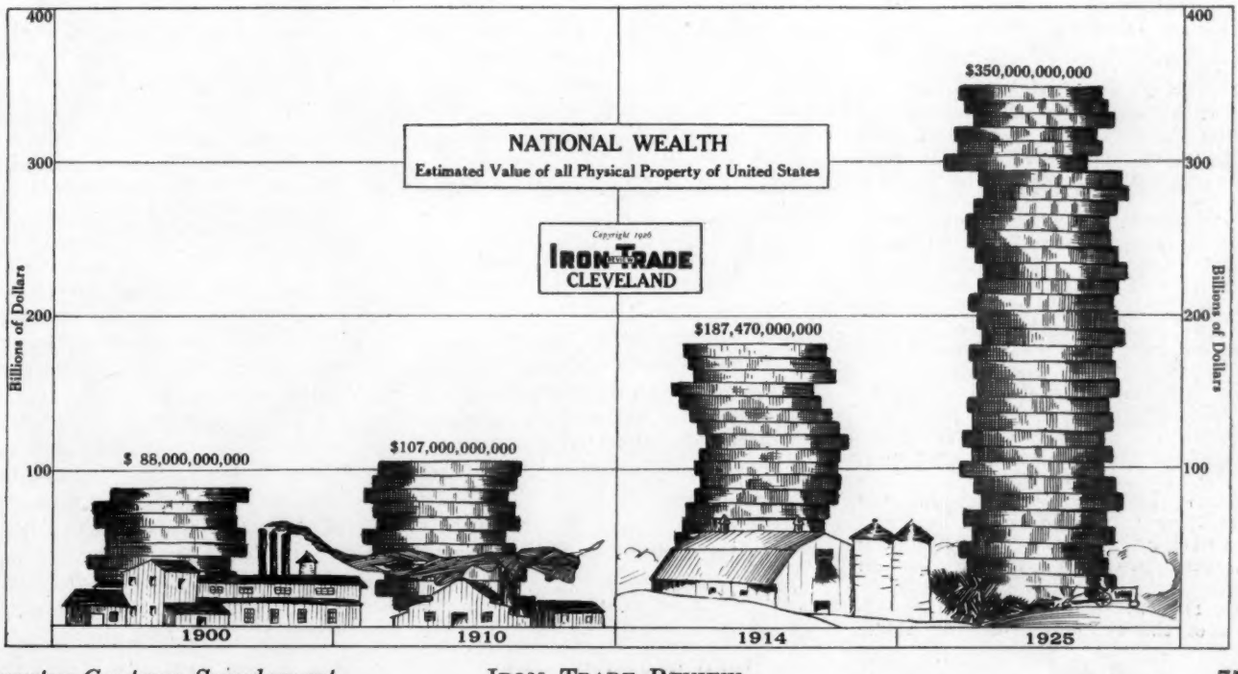
Diffusion of Wealth Is Keynote of Present Age of Machine

By John W. Hill

REVOLUTIONARY changes of vast import, both economic and social, have made the past 25 years one of the most amazing periods of all the recorded history of man. The dazzling achievements of science and the rising dominance of the machine have enriched the young century beyond all reckoning in material gains. More progress has been crowded into the brief span from 1900 to 1925 than was spread over whole centuries before.

Since 1900 man has conquered the secret of flight in the air. With the radio he has annihilated space and time in the transmission of sound and even of vision. In the automobile he has bestowed upon himself the priceless gift of cheap and effortless individual transportation. These and a myriad other evidences of unsurpassed advancements have profoundly affected human existence beyond all power of calculation.

The progress of the period in this country has revolved about two great central facts. The first of these has been the astounding extension of the sway of power and machinery. The second has been the extraordinary advance of inventive genius in its mastery over the mysterious forces of nature. Together these elements of progress have created and made available a multiplicity of goods contributing to the comfort and convenience of mankind. This new wealth has not clung at the top of the human pyramid, but it has been diffused among the masses at the base as well. This is the keynote of the age.



At the heart of the brilliant twentieth century progress, supplying it with the life blood of vision of energy, of capital and of direction has been industrial enterprise. In this country more than in any other the industrial revolution has attained its highest momentum. Its result has been to increase the material well being of the population over all previous conceptions, to reduce the hours of toil and to relieve labor from the most burdensome and exhausting of tasks.

Within the last 25 years there have been a number of important developments affecting industry in the United States, which are worthy of enumeration as follows:

1. The rapid spread and use of machinery resulting in the achievement of quantity or multiple production.
2. The st.ady development of the corporate form of industrial organization carrying with it a tremendous diffusion of corporate stock ownerships among millions of the population.
3. The rise of great business units dwarfing the firms and companies of former times.
4. A distinct improvement in the tone of business ethics following the baptism of fire during the attacks upon big business which characterized the early years of the century.
5. The gradual evolution of public attitude toward big business from hostility to an acceptance of it as an economic necessity. This is evidenced by the abandonment of efforts to unscramble large corporations for the more logical "rule of reason" method of restricting abuses and regulating business practices within certain limits.
6. The abandonment by corporations of the old policy of "the public be damned" for a more enlightened policy of consideration for public opinion and greater publicity of important corporate affairs.
7. An increase in the use of business statistics in the guidance of business policies as opposed to the old haphazard method of rule of thumb, with the result of increasing business stability.

Machine Has Risen

The most important single fact relating to industry during the first quarter of the present century has been the tremendous development of the machine. The machine has made possible the multiple production of goods which has been pushed to such unsurpassed limits in this country. It has made possible the increase in wages through the reduction in the unit cost of output. Because of the machine the purchasing power of wage earners has risen much more rapidly than the cost of living. The resulting vastly increased consuming power has provided absorbing markets for the multiplying output of manufactured goods.

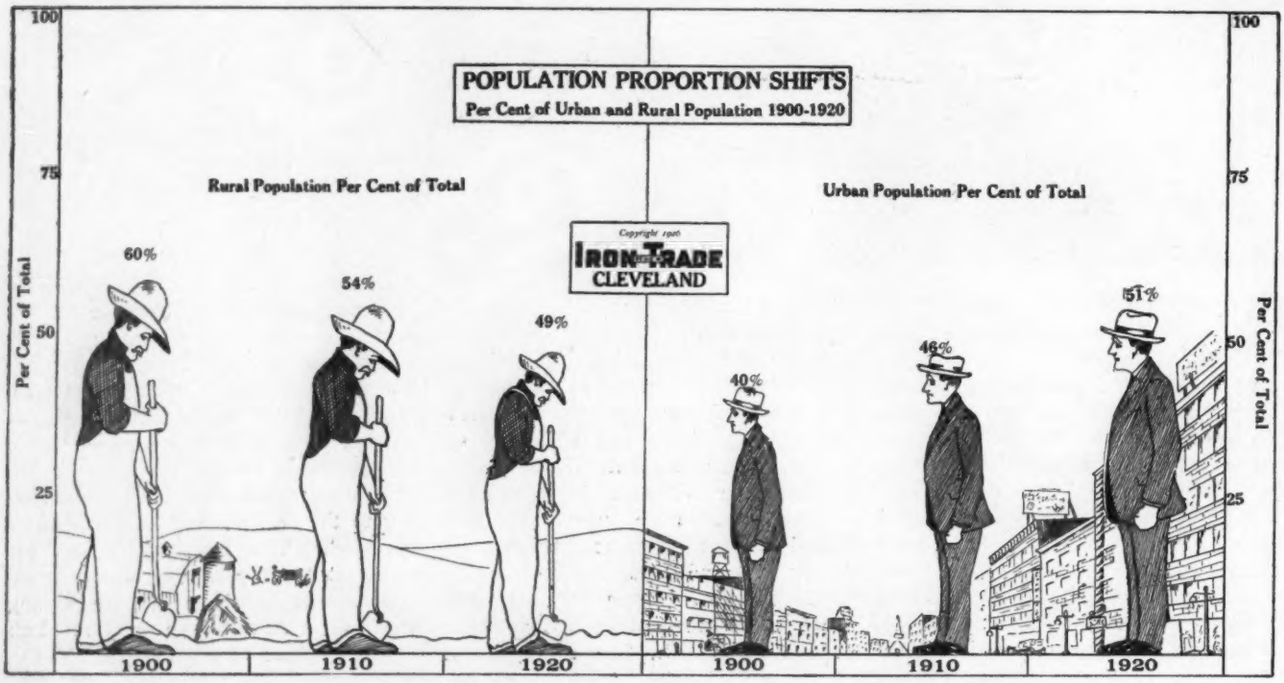
Because of power and industrial equipment the character of this country has been shifting from an agricultural community to a vast workshop. In the early part of the last century more than 80 per cent of the population was engaged in agriculture. By 1900 about 60 per cent of the country's population was rural and 40 per cent lived in cities. By 1910, 54 per cent of the population lived in the country and 46 per cent in urban communities. By 1920, the year of the most recent census, 49 per cent of the people of the country dwelled in rural sections, while 51 per cent lived in the cities.

Since 1920 the drift from country to town has been even more pronounced. The industrial machine has called ever increasing numbers of the population to tend it while the use of labor-saving machinery on the farm has greatly increased the per capita productivity of farmers. Relatively fewer numbers of farmers have no difficulty in providing the food for the relatively greater number of hungry mouths in the city.

America's tremendous industrial growth may be attributed to five great fundamental factors, as follows:

1. Ample power reserve.
2. An abundance of raw materials.
3. Large accumulations of capital for investment.
4. Enthusiasm and organized genius of management in a new country free from the ancient traditions existing in the old country.
5. A stupendous homogeneous market tied together by marvelously developed transportation facilities, devoid of impeding tariff duties between the separate states.

The vast coal reserves and water power developments and the enormous supplies of such raw materials as iron ore and copper have been the basis for the country's great industrial expansion. The population since 1860 has increased by more than 200 per cent. One factor in this increase has been the immigration of about 30,000,000 people. This growth of population has added greatly to the supply of labor, but such has been the development of manufacturers and the abundance of farm land in the coun-



try that there has always been recurring labor scarcities particularly of skilled labor.

As a result of this situation, industry has utilized its power and its wealth of raw materials and of inventive genius in the development of labor-saving machinery. Lacking a force of skilled laborers the American alternative has been machines. When other countries have used labor freely, America has used capital, invested in machinery.

It was recently estimated that in 26 leading industries, the United States employed three times as much capital per wage earner as was employed in the manufacturing establishments of Great Britain. From 1880 to 1920 there was an increase in investment capital of manufacturing from $2,790,000,000 to a total of $44,569,593,771.

One of the most important industrial characteristics of the past 25 years has been the widespread adoption of the corporate form of organization for practically all large enterprises and for many small ones. The corporate form has been one of the most potent factors in the rise of great industries and in the development of what is known as big business.

The growth of business on a big scale in the United States was inevitable. Nature in this country, had spread her pattern on a large scale. Distances were great and potential consuming markets were gigantic. With the development of the machine and the extension of railroad transportation after the civil war the exploitation of this growing domestic market followed in natural order. It provided an alluring object of conquest as it developed with a population ever increasing in numbers and in wealth. In order to engage in the struggle in this great arena of trade business leaders early found that large capital investment was required. Meanwhile competition grew keener and keener and often actually unscrupulous.

Rivals Make Agreements

The destructive effects of unrestrained competition began to occur to business leaders and combinations or agreements by the rivals began to be made. The first of these efforts took the form of pools or agreements for the distribution of business and for the fixing of prices. Out of this early movement gradually grew the corporate form as it has been developed on so tremendous a scale in the past 25 years.

"Within another quarter of a century" says the National Industrial Conference board in a recent study, "if the diffusion of ownership affected by the incorporation of business continues as it has during the past 25 years, individual ownership of manufacturing establishments and plant control as owned by one man will have passed from American industry."

Individual Ownership Passing

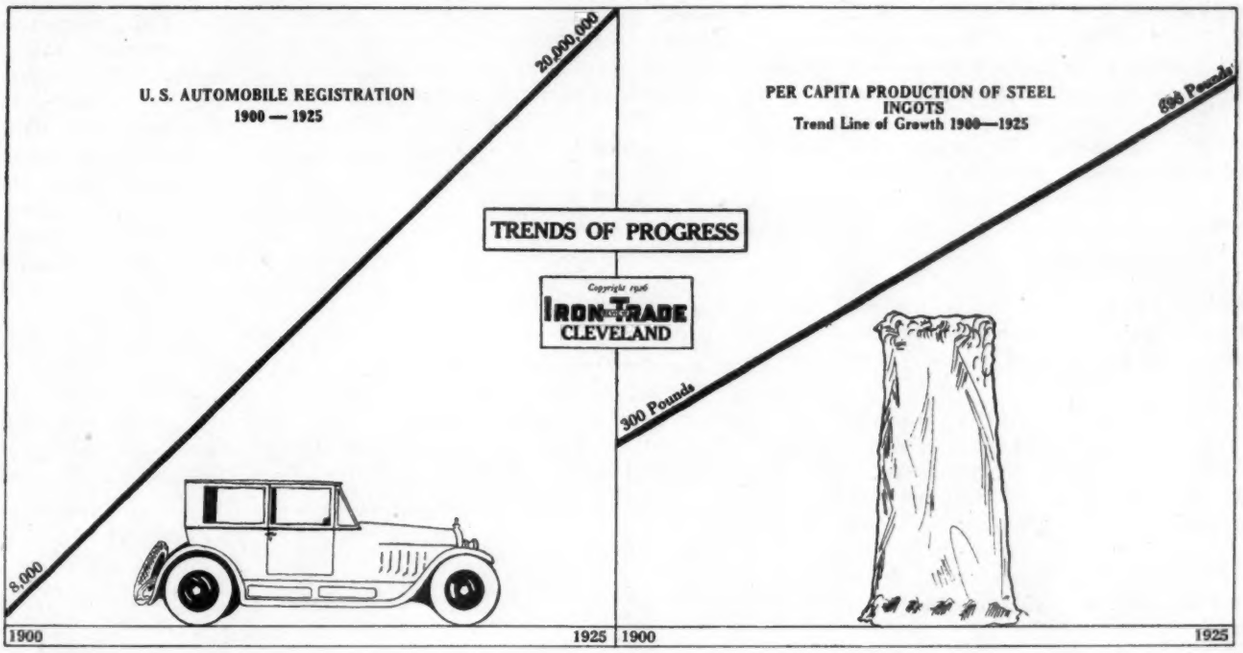
The earliest census inquiry into the character of ownership was that of 1900, when there were 37,123 manufacturing establishments in the United States operated by corporations. They constituted 18 per cent of the total number in the country. In 1919 a total of 91,517 manufacturing establishments out of a total of 290,105 were incorporated. This was 31.5 per cent of the total, which number employed 86.5 per cent of all the wage earners and produced 87.7 per cent in value of all manufactured products.

In 1904 corporations employed 70.6 per cent of all earners in industry. In 1914 this proportion had risen to 80.3 per cent; by 1919 the last year for which these figures are available, corporations as noted above employed 86.5 per cent of the total wage earners in industry, while individual owners of establishments employed only 13.5 per cent compared with 29.4 per cent employed by individuals in 1904.

A similar study of the value of commodities produced by corporations as compared with those produced by owner-manager establishments shows that in 1904 corporations produced 73.7 per cent. In 1914 they produced 83.3 per cent and in 1919 they produced 87.7 per cent of all manufactured articles.

There are numerous advantages of the corporate form of organization. One of the most important of these lies in the fact that it permits the concentration of huge sums of capital provided by large numbers of people. By this means the relatively small resources of a great many people may be brought together and applied to industry. Through the feature of limited liability which limits the responsibilty of stockholders only to the extent of their holdings, investments in corporate securities have become extremely widespread and popular.

Many estimates of the number of investors in this country have been made. Probably one of the most



How American Business Has Grown

Census year	Number of establishments	Number of workers	Value of products	Capital invested
1860	140,433	1,311,246	$ 1,885,861,676	$ 1,009,855,715
1870	252,148	2,053,996	3,385,860,354	1,694,567,015
1880	253,852	2,732,595	5,369,579,191	2,790,272,606
1890	355,405	4,251,535	9,372,378,843	6,525,050,759
1900	207,514	4,712,763	11,406,926,701	8,975,256,496
1910	268,491	6,615,046	20,672,051,870	18,428,269,706
1920	290,105	9,096,372	62,418,078,773	44,569,593,771

reliable is that there are now 15,000,000 owners in corporate stock in the United States compared with only 4,000,000 in 1900. Thus while the population of the country has grown about 40 per cent during the first quarter century the number of people who own stock has increased by 225 per cent. It is further estimated that one out of every six persons is the owner of a bond of some kind. The habit of investment in securities was given popular impetus during the war when millions of people became investors in the United States government securities. The wide diffusion of corporate ownership, as well as a more enlightened public policy on the part of business, has resulted in large companies taking the public into their confidence on matters of earnings production, etc. This modern policy of publicity has a foremost exponent in the United States Steel Corp.

Corporations for private business purposes were chartered occasionally in the earlier years of the nation's history. At first a separate law was required for the granting of each charter. The real beginning of the corporate form of organization dates from about the period of the Civil war.

At first pools or agreements were tried by weary competitors but these were found to be ineffective. A more effective method soon was discovered. In 1882 the various corporations controlled by the Rockefeller corporation in the oil industry were reorganized as a Standard Oil Trust. All of the stock was turned over to a board of nine trustees and the stockholders received in exchange certificates issued by the trustees. These certificates represented ownership in the constituent companies. Management was entirely in the control of the trustees. The nature of this combination gave rise to the name of trust which has since clung as a term of odium to many big corporate combinations.

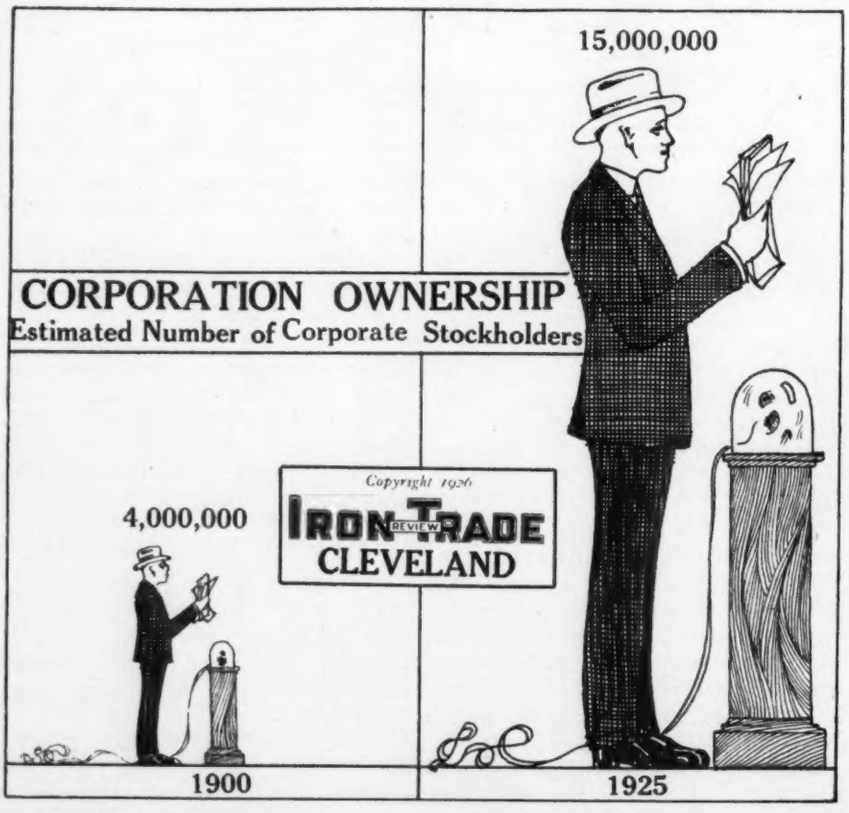
Attracted by the success of the Rockefeller interests other industries adopted the same expedient. Trust in the legal sense became common. In 1890 the Sherman antitrust law was enacted and in the next few years, trust as a legal form of business organization, passed out of existence. The term trust, however, has persisted.

Deprived of the trust form of organization, industries sought other means of consolidation. Some of them tried the method known as a holding company which is a separate corporation chartered for the purpose of holding stocks of various companies wishing to combine their interests. The Standard Oil Co. operated in this manner from 1899 to 1911 when it was ordered dissolved by the Supreme Court as in violation of the Sherman antitrust law. As a result of these developments the tendency in recent years has been toward the creation of still closer combinations, through actually merging several corporations into one.

Through one form or another, however, and over all obstacles, industrial organizations have tended inevitably toward combinations into larger and more concentrated units. This path has not been strewn with roses. The early part of the present century was enlivened by vigorous "trust busting" prosecutions and agitation. The Sherman law was invoked to shatter some of the large business enterprises that were shooting up with the birth of the new era of tremendous industrial development which appeared around 1900.

Theodore Roosevelt in the early days of his career as President led the crusade against so-called predatory combinations of capital. He sought to draw the line between good corporations and bad ones. Hostile public opinion of the time, however, drew no such line. Suspicion and odium descended upon big business enterprises. Some of this ill favor was invited because of the unscrupulous methods of some corporations in their dealings with the public and competitors. Prosecutions of numerous so-called trusts were begun indiscriminately. Muckraking magazines sprung up like mushrooms. The result was distinct unsettlement for a time of financial and business sentiment. Even these developments, however, neither checked the great surge of business expansion in this country nor seriously affected the growth of business into big units.

Next to the unscrambling of the Standard Oil Co., the most important corporate prosecution was that brought during the Taft administration asking for the dissolution of the United States Steel Corp. The lower



court found no violation of the Sherman law and the Supreme Court in 1920 dismissed the suit, having found no evidence that the Steel corporation was a combination in restraint of trade.

Democrats Regulate

The Democratic party came into power by the election of 1912 upon a platform pledged to more stringent regulation of business combinations. Immediate results were seen in the Clayton act and in the authorization of the federal trade commission. The Clayton act was aimed at practices believed contrary to public interest but which congress considered inadequately covered in the Sherman law.

The creation of the federal trade commission was hailed as a great step of progress. It has failed completely, however, to live up to the great hopes entertained for it. As pointed out by one observer there is apparently something wrong with its methods and with its interpretation of the laws. In most of the cases where it has issued "cease and desist" orders the courts have reversed the decision of the commission. For a majority of the questions brought before the commission legal remedies existed before the commission came into being.

The commission has seen fit to adopt obnoxious methods of prying into private business affairs, and a well-defined sentiment now exists for its effacement. This seems true even though the commission, with the advent of the present administration, apparently adopted a policy more designed to help business rather than merely to persecute it. Said the *New York Times* recently:

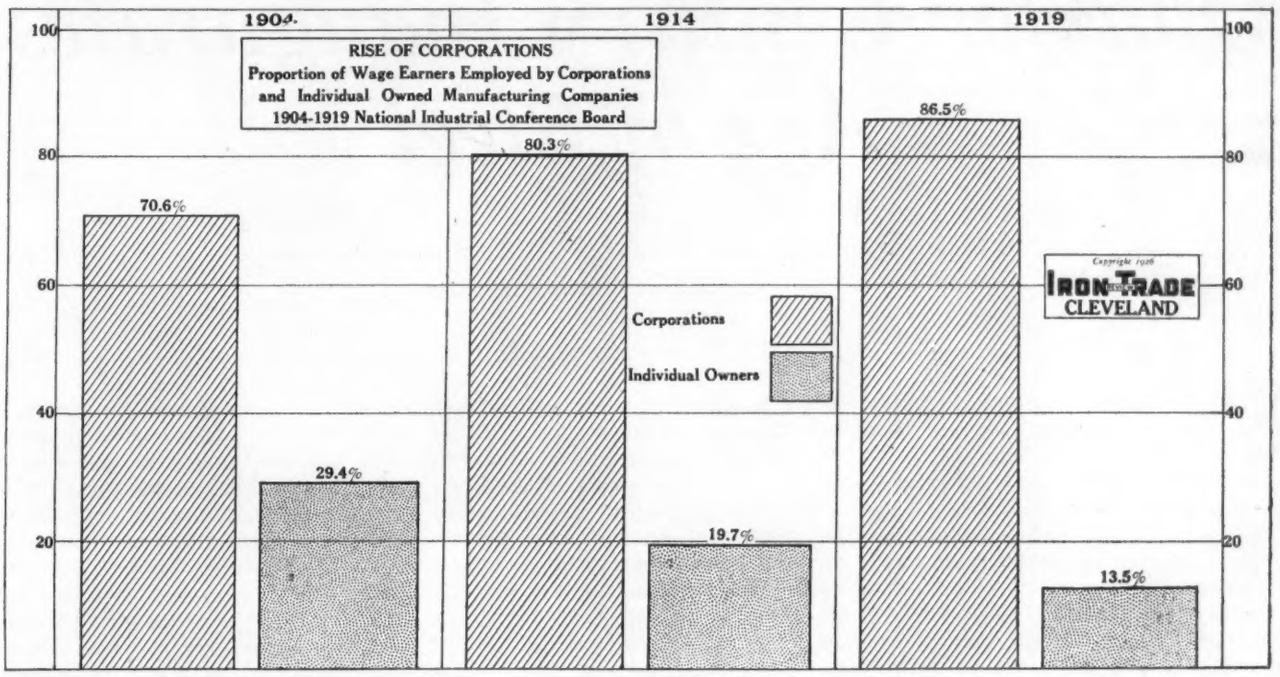
"The recent proceedings of the commission in the matter of the alleged aluminum trust have focused attention on the commission's methods and have not created a favorable opinion. So it is not singular that there has risen a great deal of sentiment for getting rid of it altogether. There does not appear to be any real wrong that cannot be handled as well without the commission as with it."

The prevailing feeling toward the commission merely symbolizes the great change in the public's attitude toward the whole subject of big business. The most impassioned demogogues now despair of commanding serious attention in attacks on business, simply because of its bigness. This was shown recently in the outburst in congress against certain proposed food store and baking mergers. The government proceeded in an orderly way to establish whether or not the mergers were against the public before the combinations took final form. The whole matter did not occupy the front pages for above two or three days and no signs appeared that the public was alarmed lest it be devoured by the hobgoblin of big business. Neither did business break with a cold sweat of fear lest a general attack break out upon it.

This can mean only one thing. The public is no longer actively hostile to large combinations. Consciously or unconsciously it is widely recognized that the present unexampled living standards of the American people are due to the employment of huge aggregations of capital, plant and equipment in mass production and that mass outputs have made possible the reduction of unit costs and the elevation of wage rates, with consequent rising purchasing power and living standards.

The more moderate view toward big business has been fostered by the widespread distribution of corporate securities. Speaking of this problem, one writer says:

"There has appeared a somewhat changed sentiment on the part of the public which has come to have a better understanding of the nature of big business and of its virtues as well as its faults. While the laws and court decisions against combinations found to have engaged in unfair practices have grown more stringent there has at the same time grown up a tendency not to condemn large corporations merely on account of their size. Thus the rule or reason pronounced by the Supreme Court in the Standard Oil and American Tobacco cases has gradually been adopted by the government and by the public."

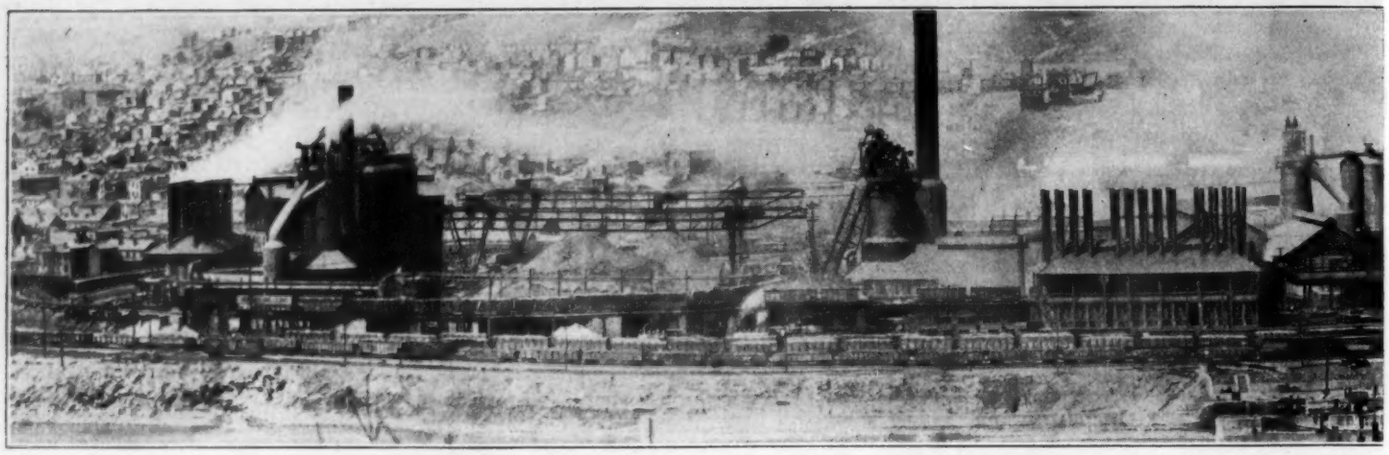


The feeling of the government itself toward combinations is seen in its railroad transportation act which specifically calls for the consolidation of railroad companies into a few large noncompeting railroad systems in the interest of economical operation and low cost.

New Tendencies Appear

Recently, however, a new tendency has sprung up in business finance which has been the subject of wide criticism. This relates to the growing practice of issuing nonvoting common stock for distribution to the public, while investment bankers or other powerful financial groups hold the voting common stock. This places the

(*Concluded on Page* 793)



Early in the Twentieth Century the Edgar Thomson Works of the Carnegie Steel Co. Had Become One of the Most Extensive Iron

Quarter Century Inaugurates Age of Steel

Transition from Wrought Iron Accompanied by Transformation in Plant, Equipment and Business—An Historical Review of an Epochal Period in Industry

By J. F. Froggett

STEPPING out from the nineteenth century regime of wrought iron and the outworn local industrial system, which broke down almost completely under stress in the late 90's, the American iron and steel industry just a quarter century ago plunged headlong into an entirely new era. New processes of mill manufacture, those developing around the driving force of the economical and convenient power of electricity, were replacing in large part the scattered little bar iron rolling mills. The tremendous business "boom" which followed the ending of the Spanish-American war in the autumn of 1898 had forced upon iron and steel producers the imperative necessity for greater production facilities, especially of plates, sheets and wrought pipe.

This demand had been reinforced by the necessity of taking care at furnaces and mills of tremendous streams of cheaply won and cheaply transported iron ore from the Lake Superior mines then first getting into production. Congress was discussing enforcement of the federal laws prohibiting secret rebating of railroad freights which had become a general menace to industry. "Pools" had become unpopular among manufacturers as well as buyers of iron and steel. The last billet "pool" went to pieces in the Middle West as the new century was dawning, although some of the wire "pools" persisted in a lame sort of way for several years afterward.

The closing quarter of the century preceding had been devoted largely to pioneering. Previously blast furnaces had located wherever pockets of native iron ore had been discovered in proximity to wood with which to supply the charcoal fuel. Thus their usefulness was limited, being circumscribed by local conditions of raw material supplies and of markets.

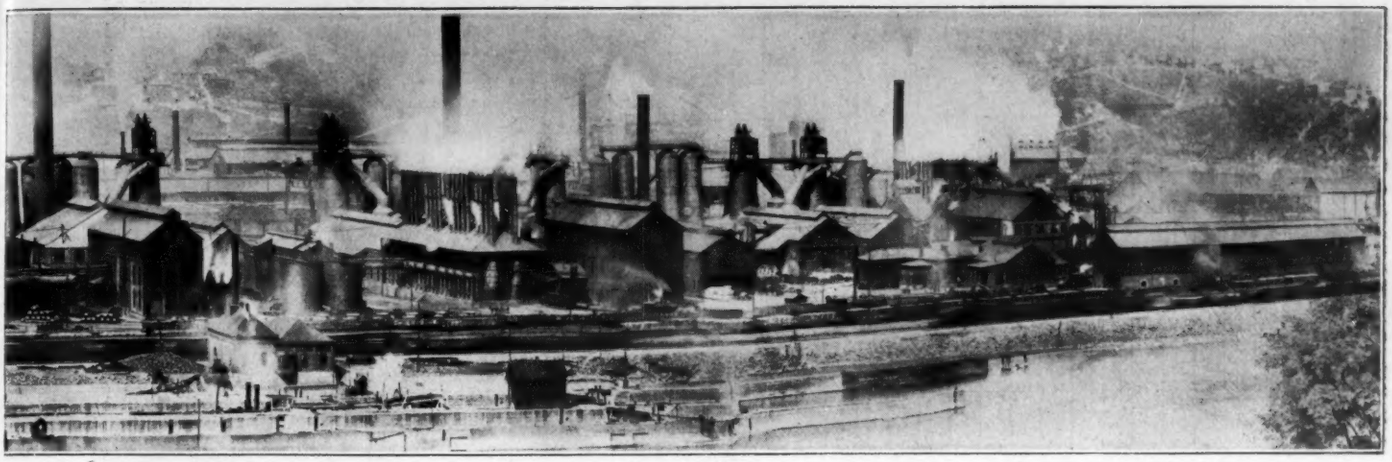
The new South, turning from agriculture to coal and iron, was struggling to its feet. The opening up to settlers of the Indian country west of the Mississippi and along the Missouri rivers led to the Sioux uprising of 1876 resulting in the massacre of General Custer and his command. But, with the exception of General Miles' campaign against Geronimo in 1885, which broke the power of the fierce Apaches in New Mexico and Arizona, this was the last big fight.

Western Needs Give Impetus

The newly opened West was insatiably hungry for iron and steel products, and from these demands grew four major industrial developments early in the new century. First came the era of transcontinental railroad building with its demand for vast tonnages of rails and car building materials, reaching its top in 1906 with a total of 3,977,872 tons, never since attained in any year. Of this output of rails only 186,413 tons were rolled from open-hearth steel. Secondly came the demand for wire fencing and the like, and the newly invented wire nails for construction. Third, came the need of the food packing industry for tin plate and sheets. And fourth came the response of the industry with huge tonnages of wrought pipe to aid in the oil district development.

Demand for the heavier rails for transcontinental lines with their sturdier equipment led to the abandonment of the light wrought iron rail which reached its apogee in 1875 with an output of 447,000 tons. The bessemer converter had appeared, steel had been made at Wyandotte, Mich., near Detroit, in 1864, and first rolled into rails at Chicago. The country's bessemer rail production passed wrought iron in 1877 but did not reach its first annual million ton output until 1881. Still heavier railroad equipment demanded the tougher open-hearth rail and in 1911 the bessemer rail was passed by the open-hearth with 1,676,000 tons.

Whereas the total annual output of



and Steel Establishments in the World. The Quarter Century Has Witnessed a Constant Improvement in its Equipment

iron and steel rolled products in 1875 was about 2,000,000 tons, with blast furnaces, exclusive of charcoal stacks. Averaging 25 tons a day, production in 1900 was 13,500,000 tons, with blast furnaces averaging 175 tons daily.

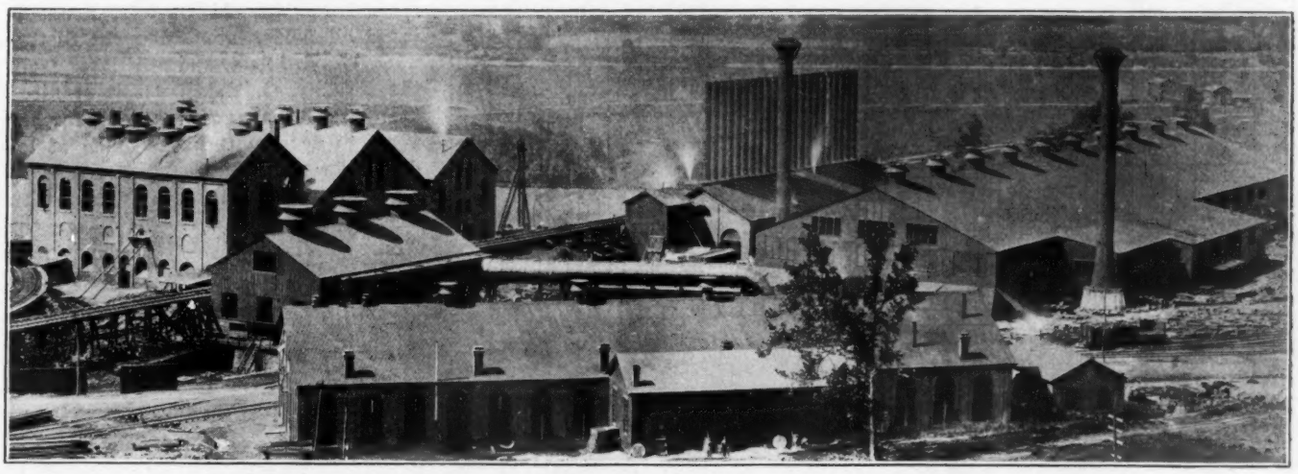
The last ten years of the nineteenth century had included the most destructive era of competition in the history of the American industry. The unsettled financial and political conditions of the times had plunged the country into most profound economic depression. The iron trade had to bear its share of the business upheaval. The small rolling mills and blast furnaces of that day were largely owned, managed and financed locally. Hence both their resources and their markets were restricted sharply.

In the fierce fire of competition that ensued for whatever little business was going at the time, the little isolated bar and plate mills wilted and closed, many of them permanently. In July, 1897, bessemer pig iron averaged $9.39 a ton at Pittsburgh, billets brought $14 a ton, steel rails $18 a ton, while best refined bar iron brought no more than steel, or 95 cents per 100 pounds at Pittsburgh. Amalgamated association puddlers were working for $3.50 to $4 a day, and $1 a day was the common wage for day labor. This contrasts with today's basic wage of $5 a day for common labor. The last Amalgamated settlement at Youngstown, O., gave the puddlers a tonnage wage rate of $11.38.

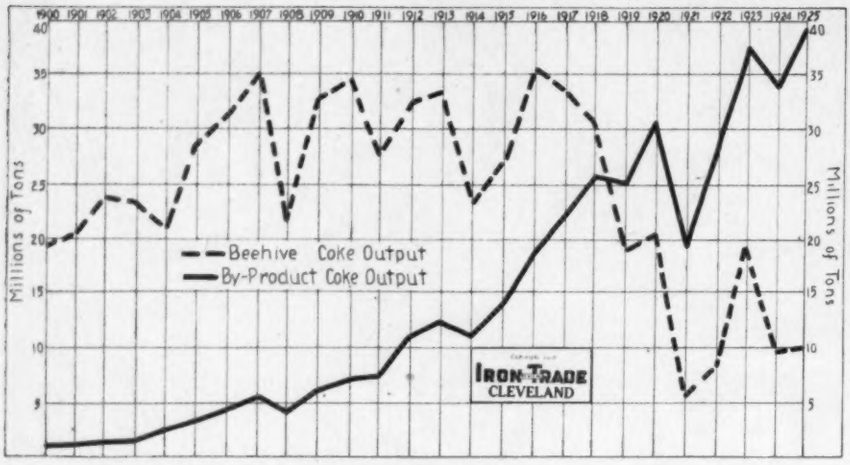
Many Executive Changes Made

The strain of these and subsequent stirring days told very heavily upon the ironmasters of those times who were men in the 60's and 70's and many of them passed out as the new century opened. Among these were Alexander M. Byers and James Hemphill at Pittsburgh; John Wister at Philadelphia; Richard Heckscher, of Richard Heckscher & Sons; Frederick Wilkes, builder of the first blast furnace at Lowellville, O.; David W. Hitchcock, president of the National Tube Co. before its absorption; Hon. B. F. Jones, of Jones & Laughlin, John Graff and George Singer, all of Pittsburgh; Charles Lukens, of Conshohocken, Pa.; Alan Wood Jr., of Philadelphia; Robert P. Linderman, former president of Bethlehem Steel Co.; Hon. Abram S. Hewitt, for 50 years in the iron business; Nathan Washburn and Philip Moen, identified with the wire industry at Worcester, Mass.; William Garrett, inventor of the rod mill; Richard Brown, sole surviving partner of the original Brown, Bonnell Iron Co. at Youngstown, and many other equally striking industrial leaders.

The battle for the country's steel rail trade between the Carnegie Steel Co., of Pittsburgh, and the Illinois Steel Co., of Chicago, threatened to end both, which then were the most important steel concerns in the country. Casting about for something that would prevent the industry from throttling itself, the leaders happened upon a method just being evolved in the Middle West by a youthful but successful wire salesman, John W. Gates. He appeared upon the scene just when the West with its vast cattle ranges and new farms were demanding a cheap and quickly built fence. A little group of northern Illinois farmers and business men had invented and were manufacturing in a small way barbed wire for fence. Gates joined in, pirating patents as most of them did in that day, finally gathering into



THE EDGAR THOMSON WORKS IN 1875. NOTE CONTRAST WITH ILLUSTRATION ABOVE



PRODUCTION OF BEEHIVE AND BY-PRODUCT COKE COMPARED

one company the principal competing wire concerns around the nucleus of his St. Louis plant, and out of this came the first wire "trust," Through its operations, all were enabled to live, and the western farmer got cheap fence material in the quantities he demanded.

Out of that same section of northern Illinois from which Gates had come, stepped a young lawyer who had been a county judge, Elbert H. Gary, who carried to New York finance in the person of J. Pierpont Morgan Sr., the story of western achievement in iron and steel. The western concerns needed funds with which to co-ordinate their Chicago works with the Lake Superior iron ore and their coal properties. The first move failed in its primary object, due to the Spanish-American war, but only for a while. A little later, at a New York dinner a speech made by Charles M. Schwab, then a young steelmaker with Andrew Carnegie at Pittsburgh, opened up to Morgan the financial possibilities in the iron and steel industry. This led to the formation of the United States Steel Corp. Into its lap dropped a group of "little trusts" which had been organized by two industrious Chicago promoters, brothers, Judge William H. and James H. Moore, including the National Steel Co. headed by Henry Wick, of Youngstown, O., the American Sheet Steel Co., the American Steel Hoop Co. and the American Tin Plate Co.

Tin Plate Company Organized

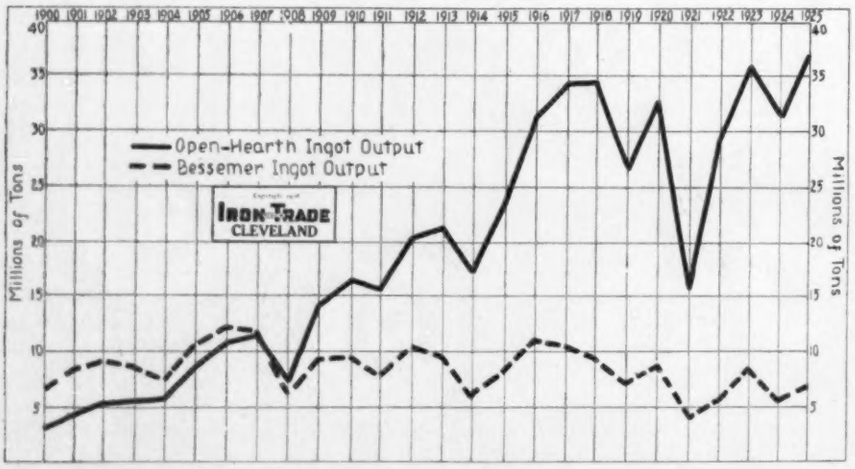
The third tremendous urge from the growing West for industrial products had led to the formation of the Tin Plate company. The food packing industry, starting with meat at Cincinnati and later at Chicago, including packing of vegetables in the fertile states of the Middle West and finally fruit, was just getting well under way. The enactment of the tin plate tariff law sponsored by William McKinley had started a new American industry which the Middle West was quick to grasp. Tin plate mills sprang up in almost every state west of the Allegheny mountains. From a production of one ton less than 1000 in 1890, American tin plate production in ten years had amounted to 1,750,000 tons. Then it grew by such leaps and bounds that in the first five years of the twentieth century it had produced the same tonnage as it had taken ten years previously to attain.

The little bar iron mills that lay scattered all around the country, left out of the other "trusts," were gathered together into the Rupubilc Iron & Steel Co. with G. Watson French as chairman and Alexis W. Thompson as president. Its properties were scattered from Alabama to Wisconsin, and from Illinois to Pennsylvania, embracing about two score of rolling mills. One of its prize producing territories then was the Indiana "gas belt." But the advent of natural gas as fuel in the steel business was short-lived due to short supply, its place in industry being taken by its first cousin, fuel oil.

In about the first ten years of the Republic company's life it had demolished a score and a half of its uneconomic bar iron mills, passed out of the "bar iron trust" class for which it originally was formed, and with the removal of a couple of small bessemer converters from an Alexandria, Ind., mill to its Brown-Bonnell works at Youngstown, O., it began with the rest to manufacture steel. To this day some of the bar iron mills continue to struggle along in scattered locations, a certain amount of puddled and scrap bar still being used by railroad car and implement makers. Such important concerns as the Reading Iron Co., Reading, Pa., and A. M. Byers Co. at Girard, O., continue to make wrought iron pipe from puddled iron. By and large, bar iron passed from the industrial picture as a tonnage proposition in the last century.

The fourth great urge to the iron and steel trade which came out of the West due to its necessities bore directly upon the iron and steel wrought pipe industry. While what once were considered large tonnages of wrought casing, line pipe, etc., came to the mills from the old western Pennsylvania oil fields, later from the Sisterville, W. Va., field, and still later from the Findlay, O., fields, yet it required the vast tonnages needed farther West to develop the pipe trade of today. First in point of time came in the southern California fields with long pipe lines to the coast, then the Texas-Oklahoma fields with vast pipe lines to the Gulf ports, and now the Arkansas-Louisiana and the Caspar, Wyo., fields, together with the central Kentucky sources. This all has been a development of the past 12 or 15 years, leading to an almost marvelous expansion in the manufacture of steel welded pipe in America.

As an offshoot of this industry now



OUTPUT OF BESSEMER STEEL INGOTS AND CASTINGS COMPARED WITH PRODUCTION OF OPEN HEARTH

is developing the manufacture of seamless steel tubing which is expected to come along fast with the installation of new and important mills in various sections of the Middle West, but all of them having an eye to the continuing needs of the growing western oil countries.

Specialty Makers Prospered

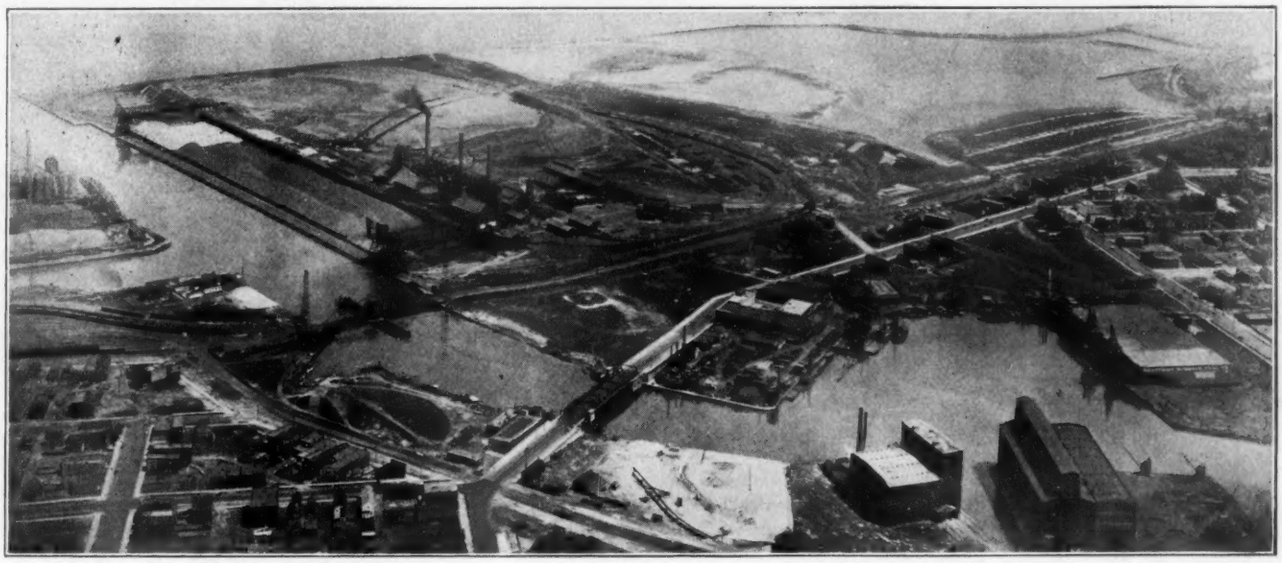
The age of steel having definitely arrived, there immediately sprang up a number of small concerns which aimed by sticking to specialty lines to keep out of the way of the larger "trust" concerns. One such, the Youngstown Iron Sheet & Tube Co., as first known, made wrought iron couplings and puddled iron sheets. Another came up through a small mill connection and scrap business at Indiana Harbor, Ind., now known as the important Inland Steel Co. Still others grew naturally from the exigencies of local demand, such as the Andrews Steel Co., at Newport, Ky., and the American Rolling Mill Co., at Middletown, O. Then, too, came along the Atlantic Steel Co., at Atlanta, Ga., with such important independents as Jones & Laughlin Steel Co., Pittsburgh Steel Co., and many others which might be named, including the Colorado Fuel & Iron Co. and the Wheeling Steel Co. in the Middle West; the Reading Iron Co., the Bethlehem Steel Co., and the Lackawanna Steel Co., continued to grow and flourish in the East.

Speaking of the Colorado company will recall to the memory of men still active those stirring speculative days when one "took a flier" in the stocks of Colorado Fuel and Tennessee Coal & Iron, as they were known, with the same keen interest they would manifest in "sitting in" on a poker game. So also might it be said in those days of the stocks of the scores or more Lake Superior iron ore mining concerns with headquarters at Cleveland, Duluth and Marquette, Mich., which prior to their absorption into the steel corporation and the largest independents, rose and fell with about the same frequency as the sun in the morning and evening.

The past quarter century has seen all that speculation swept off the boards for the most part. The purely promoter-speculator has disappeared as such. The advent of the solid companies manufacturing iron and steel has been the steadying influence so badly needed by both buyers and sellers in the last quarter of the last century. Many of the former speculative favorites now are staid and steady components of great concerns into which their former identities have been merged completely.

Not entirely unruffled was the progress of the steel industry with the formation of the big concerns. Early in this century the United States government put the big fellows under the legal microscope and Commissioner of Corporations Garfield gave them a thorough going-over in 1904. Then, after the absorption of the Tennessee company by the United States Steel Corp. in 1907, due to panic conditions, came the congressional investigation begun in the spring of 1911 by a committee with A. O. Stanley as chairman. Finally, on Oct. 26, 1911, was filed the famous "dissolution suit" against the Steel corporation by the federal government, which dragged along for many years until on March 1, 1920, the United States Supreme Court decision cleared the big concern of the once popularly denominated "trust taint."

Early in the new century appeared a marked tendency for the new iron and steel producers to seek locations along important waterways. Tom L. Johnson, afterward mayor of Cleveland, late in the preceding century had removed his works from Johnstown, Pa., to Lorain, O., on the dictum that lake iron ore and coal met in natural freight rate set-off along the southern shore of the lower lakes. This was the dictum which less than ten years after organization in April, 1901, led United States Steel Corp. leaders to select the sand dunes along the southern end of Lake Michigan as the site of the great works at Gary, Ind. Much the same thing has led to removal of the mills from Scranton, Pa., which at Buffalo became the Lackawanna Steel Co. There also the Donner Steel Co., the Seneca Iron & Steel Co. and others were built. Later came the building of the Upson Nut Co.'s and McKinney Steel Co.'s blast furnaces and mills at Cleveland, the further enlargement of the works at Lorain, the establishment of blast furnaces at Erie, Pa., and expansion at Detroit and Toledo.



THE CALUMET DISTRICT SHOWN ABOVE, WITH THE GARY DEVELOPMENT, MARKED A NEW ERA IN WESTERN STEELMAKING

Schwab is Center of Mergers

But expansions and mergers were not confined to the Middle West. Singularly enough, the merger movement in the East as in the Middle West has centered around the personality of the same operating genius, Charles M. Schwab. No sooner had Schwab resigned as first president of the United States Steel Corp., than he cast about for something new, driven by his restless energies. He concentrated upon the Bethlehem Steel Co., then an important armor plate and armament-building machine shop. He reached out and absorbed the

Pennsylvania Steel Co., with works near Harrisburg, Pa., and with a subsidiary, the Maryland Steel Co., having works at Sparrows Point, Md., near Baltimore, a tidewater site. That locality since has seen a wonderful industrial development, including sheet and tin plate mills, and now is likely to see large wire mills.

In succession came Bethlehem's absorption of the American Iron & Steel Mfg. Co., with works at Lebanon, Pa. With these eastern works also went important interests in the century old Cornwall ore banks; also in the Mayari ore fields of Cuba. Again came the absorption of the Lackawanna Steel Co., giving the Bethlehem company access to the Great Lakes together with Lake Superior iron ore properties, coal properties and lake vessels. Again the industrial world was startled when the Bethlehem company took over the important properties of the Midvale Steel & Ordnance Co., including the Cambria works at Johnstown and important lake ore and additional coal properties. All these mills since have been enlarged and re-equipped and their rebuilding still is going on at the expenditure of millions.

THE ALABAMA STEEL INDUSTRY IS A DEVELOPMENT OF THE QUARTER-CENTURY—ENSLEY STEELWORKS ARE SHOWN ABOVE

Following the Schwab dictum logically have come the latest developments chronologically in the blast furnace project at Troy, N. Y., which, when the 24-foot stage of water in the Hudson river becomes a reality, will put this furnace practically at tidewater. Too, along the same general line has moved the project to build a blast furnace near Boston, Mass., the work now being accomplished by the Mystic Iron Co.

Both these latter projects have been founded upon and are an outgrowth of the development of the by-product coke industry in America. This development has been one of the wonders of the present century. While by-product coke ovens had been constructed at isolated spots earlier in the century, yet up to the Great war the most of the important iron and steel concerns still drew largely upon the facilities in the Connellsville regions, either for coke or for coking coal supplies. Meanwhile the vast coking and steam coal reserves of West Virginia and Kentucky had begun to develop and under the stimulus of war, the building of by-product coke ovens appeared everywhere. In 1917 the output of the by-product ovens with 22,500,000 tons, first surpassed the Connellsville regions with a little less than 18,000,000 tons. Last year the by-product output came within a few thousand tons of 40,000,000 tons, the Connellsville regions being permanently eclipsed as leader in the American coke industry.

Dramatically forced upon the attention of the American steel industry by the tremendous exigencies of the Great war, the making of alloy steel gained an impetus second only to the by-product coking industry. While some attention had previously been given to the production of tool steels and the Crucible Steel Co. of America had specialized to some extent in their production, and while also the use had grown more general of small quantities of nickel in making bridge materials and of copper in the making of an alloy sheet, yet the greater quantities of special alloy steel demanded for war purposes stirred the steel industry to its foundation.

The Ford Motor Co., Detroit, had given the first important order for vanadium steel in commercial quantities, in the beginning of the second decade of the new century, to the United Steel Co., then a small concern at Canton, O. But with the war out of the way, the alloy steel industry continued a tremendous development which has resulted in many important concerns specializing in their manufacture, including the United Alloy Steel Corp., Canton, Central Steel Co., Massillon, O., Interstate Iron & Steel Co., Chicago, and Donner Steel Co., Inc., Buffalo. The Carnegie Steel Co., the Bethlehem Steel Co. and some others have continued development of their alloy steel products.

The Steel corporation proposes to expend many millions in an alloy steelworks in the Gary district. There are those in the industry who declare their belief that the day of alloy steel in America has only dawned and that the next quarter century will witness a wonderful development in its wider use, not only in the automobile industry but also in all sorts of great and small forgings, in locomotive and other machinery building, etc. Out of all this is growing the new science of steel treating which promises astonishing results.

Entrance of the Steel corporation into the South by its acquisition of the Tennessee company in 1907 brought something akin to dismay to competitors and others, but not for long. The influence of the large interest has been to stabilize a once highly speculative section, leading to the growth of important independent steel interests such as the Gulf States Steel Co. under the leadership of the veteran James Brown. The Tennessee company with George G. Gordon as president has set a pace in providing model living and working conditions for its employes.

Pig Iron Trade Changes

The ever important pig iron trade of the South has developed an astonishing reversal in form within the past half dozen years and all to its great improvement. For many years this industry produced vastly more pig iron than southern industries could absorb, forcing its sale in northern and eastern markets, often at prices that proved ruinous to the more unstable furnace interests. Battles with the railroads over freight rates brought no relief. Now, however, due to the growth of large consuming interests in the South, a very small proportion of southern pig iron moves north of the Ohio river, something like 80 per cent being consumed in the South itself. Hence for the first time in the history of the southern pig iron industry this product is bringing the same price at Birmingham, Ala., as northern iron brings at its base points. Formerly the 80 per cent went to the North and East.

Within the quarter century also has come the development of the iron and steel industry on the Pacific coast and expansion in the intermountain districts. From a half dozen struggling mills along the Pacific seaboard has

(*Concluded on Page* 792)

Today's Captain of Industry

A composite photograph of industrial leaders including Judge E. H. Gary, Charles M. Schwab, James A. Campbell, John A. Topping and James A. Farrell, with a few facts concerning the composite man.

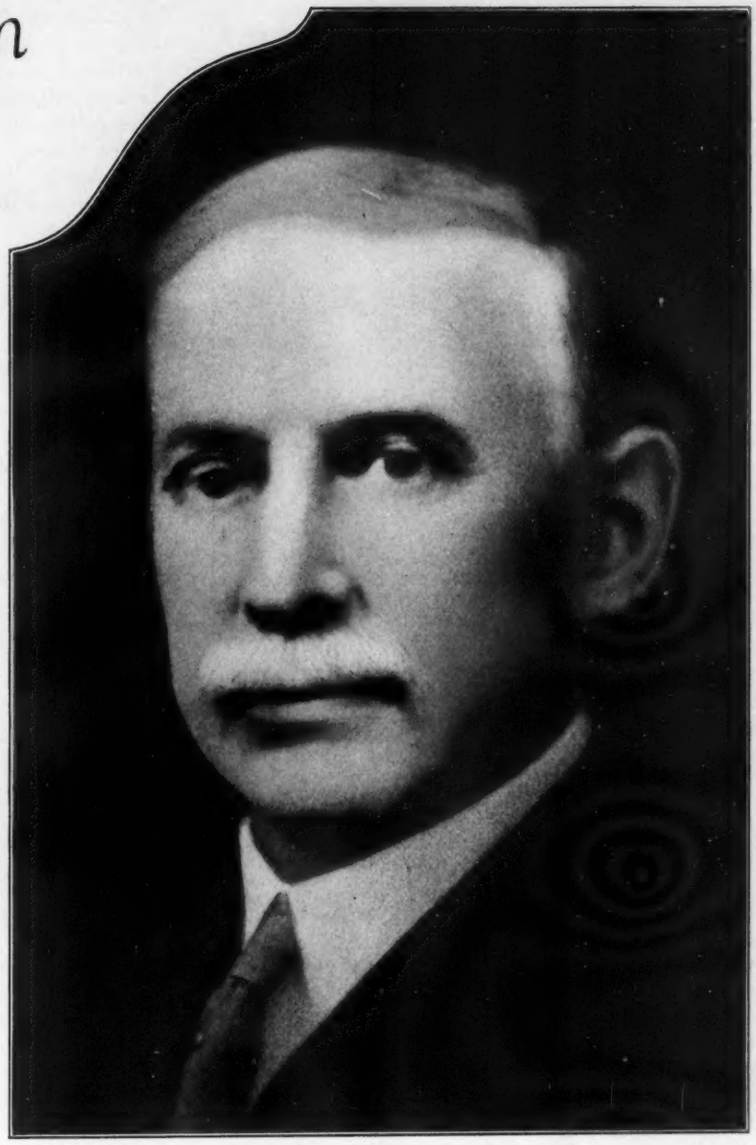
HE IS 67 years old—the average of their ages.

HE IS head of companies with physical assets of more than $3,500,000,000.

HE EMPLOYS more than 400,000 men, about two-thirds of all those engaged in the iron and steel industry.

HE CONTROLS over 35,000,000 tons of steel ingot capacity, about 60 per cent of the country's total.

HE BEGAN life "in the ranks"; has the viewpoint of the masses; able executive of the world's greatest industrial machine—the steel industry.



Steel Industry Has Developed Many Leaders

By A. J. Hain

TWENTY-FIVE years of organization and reorganization, invention, discovery and development in the iron and steel industry, seem to prove that America's resources in men of business and technical ability measure up to the country's natural advantages and opportunities.

The American steel industry as constituted is comparatively young; it has had phenomenal expansion in the past quarter century, a generation in which extraordinary demands for service of the highest type have demonstrated the character of its leaders. It has grown to such large proportions and has developed so many able executives that within the industry itself there is a tendency to regard merely as among the average, men occupying positions of much importance when considered in regard to the number of those they employ, and their responsibilities to the owners of their properties, their employes and the public.

One reason for this is that while ownership in the industry has become diffused, control is more centralized; and while the individual units have expanded, calling for managers of unusual ability, the higher executives dominate the industry, and there are comparatively few of these.

An easy task is to name the five principal personalities in the steel industry today; to name the next five is to invite discussion, and beyond the first 10 there is a large number of men of unusual attainments in management, in business promotion, in engineering and operations.

A significant fact in regard to those who might be considered as the first

FOUR American Bridge Co. officials prominent at Chicago and Pittsburgh about 1903. *In the driver's seat was E. A. Miller, then assistant to the western manager and now operating manager of the western division at Chicago. He is the only one of the four living. Beside him in the front seat was P. J. Cunneen, then manager of the Lassig plant of the American Bridge Co., Chicago. Directly behind Mr. Miller was C. Weatherson, then mechanical engineer of the western division. Behind Mr. Cunneen was Richard Paxton, then assistant mechanical engineer at Pittsburgh. The automobile is one of the first Fords, which weighed* 2000 *pounds and cost* $2000.

10 is that the average of their ages is 65 years. The youngest is 48, the next youngest 59, and the oldest is 78 years. If the youngest is excluded from the group, the average of the nine is 67 years.

The composite of the 10 is a man who has been "brought up" within the industry; familiar with every phase of it; sound and conservative in the administration of property worth billions of dollars; keenly conscious of his responsibilities to the public, and of its rights; liberal in his views as regards labor.

Events in the industry during the past quarter of a century have enthroned and dethroned many of its leaders. If life can be viewed as a continuous procession, the line of march within this period may be divided into three main divisions; those who passed out of the picture of active participation about the time of the formation of the United States Steel Corp., or soon thereafter; those who came into prominence with this organization, and others who built up important independent units; and now those of the third group, the younger generation forging ahead.

* * *

IN THE first group were the pioneers whose practical experiences dated back long before 1900. To them belongs the credit for creating many of the original organizations; they overcame numerous difficulties in financing, in operating and in transportation, they helped to lay the foundation for success.

The Original "Dollar-a-Day Men"

There was the greatest steelmaster of his day, Andrew Carnegie, who at the beginning of the quarter century was ready to relinquish command of the giant combine he had formed, and who was making overtures to the newly organized Steel corporation, his final price penciled on "a scrap of paper" deciding the issue of supremacy between them. The present generation does not give Carnegie credit for doing so much, individually, as it does credit him with having had an extraordinary sense of selection, in choosing the men needed to carry out the plans he conceived. There were his partners, or "my boys" as he called them, including Charles M. Schwab, J. H. Reed, L. C. Phipps, W. P. Palmer, F. H Kindl, David G. Kerr, A. C. Dinkey, W. B. Dickson, W. E. Corey, and others, who helped to make millions for Carnegie, and whom he in turn made millionaires. Carnegie made Schwab president of his company; but Schwab really was "discovered" by Capt. "Bill" Jones, "the greatest mechanical genius that ever entered the Carnegie mills."

Capt. "Bill" was superintendent of the Edgar Thomson works at Braddock, Pa., making sensational records in production; his chief contribution to the mechanical development of the industry was the Jones mixer that saved millions of dollars by avoiding the necessity of remelting pig iron prior to its use in the bessemer converter. Schwab was the boy in Speigelmire's grocery store when Capt. "Bill" stepped in, and Schwab asked him for a job.

"Can you drive stakes?" asked the superintendent.

"I can drive anything," declared Schwab, whose previous job had been to drive his father's coach between Loretto and Cresson station.

Schwab started driving stakes next morning at $1 a day. One day Capt. "Bill" took Schwab to Carnegie, and said: "Andy, here's a young man who knows as much about this mill as I do." Six years from the time Schwab began driving stakes he was superintendent of the largest steelmaking plant in the United States.

An incident of those days at the Edgar Thomson works reveals some of the industry's operating difficulties, and how practice differed from the highly developed standards of today. When the Pennsylvania railroad decided to adopt a certain analysis for the steel used in rolling its rails, it sent to the Edgar Thomson works the chemical composition for the steel. Capt "Bill," with all his knowledge of mechanical operations did not understand the importance of specific proportions of carbon, sulphur and manganese.

For a long time after the bessemer process came into use, forcing out bar iron for certain forms of finished products, steel was made according to rule-of-thumb methods. Capt. "Bill" finally employed a chemist. The

orders from the railroad at first called for steel with 0.35 to 0.40 per cent carbon, but afterward some orders came through specifying carbon as low as 0.35 per cent, and sometimes as high as 0.55 per cent. Whenever that happened Capt. "Bill" would say: "That's wrong; that's wrong; that should be 35"; and he would scratch out the right figure and put in 0.35. Difficulties in charging blast furnaces; "hanging charges," with disastrous explosions, and the destruction of sand molds used for casting pigs were only a few of a multitude of operating problems. They served to develop mechanical and engineering skill of the type exemplified in John Fritz. Among his many accomplishments were the design of the pneumatic hoisting device for charging blast furnaces, and the three-high rolling mill; to his genius for solving operating problems was due the success of the Bethlehem Iron Co. and the Cambria Iron Co., two companies that figured conspicuously in subsequent developments in the industry. Fritz, one of the foremost engineers of the industry, once was introduced by the secretary of the navy to a committee of the house of representatives studying naval armament problems. "Gentlemen," said the secretary, simply, "here is the most honest man I have ever known."

Carnegie's desire for a well-rounded, self-contained, establishment is what led him into the first breach with Henry Clay Frick, one of his partners who had developed the coke industry. One of the first men to see the great value of the Lake Superior iron ore deposits was Henry W. Oliver, who had made a success of iron and steel manufacture in the Pittsburgh district, and who had acquired extensive interests in the ore district, his name still identifying the Oliver Iron Mining Co., a subsidiary of the Steel corporation. Frick wanted Carnegie to form an alliance with Oliver, but Carnegie believed the Lake Superior iron ore supply was so large that there was no need for an extension of his operations in that district.

Frick disregarded Carnegie's opinions and went ahead with a bargain purchase of ore property, with Oliver, and they acquired ore lands that have proved of inestimable worth to the Steel corporation. The Rockefellers became interested in the ore industry, through vessel transportation, and with the development of this branch another group of men came into wealth and prominence, some of whom also were closely identified with the actual manufacture of iron and steel.

The rift between Frick and Carnegie widened when Frick claimed Carnegie insinuated that he was profiteering in coke at the expense of the Carnegie company, and with endeavoring to "hold up" the company for land in Pittsburgh. This was one of the events that hastened the sale of the Carnegie interests to the Steel corporation.

In the West a new group of manufacturers and organizers was springing up, with the supremacy of steel over iron established, for a multitude of finished products for which there was a large demand. The opportunities afforded by the industry were just dawning on the country, with the creation of industrial units of unprecedented proportions. At the beginning of the twentieth century the iron and steel industry was seething with mergers, combinations and trusts, and plans for vast expansion. The progress made in manufacturing methods widened the horizon of the steel industry; a tremendous market was opened up for wire, tin plate, tubes, sheets, structural material, and in every line new companies were formed, and most of them eager to extend their plants, to reduce costs by controlling the source of their supplies, and to control markets by buying out or merging with their competitors. There were such prominent figures as Daniel G. Reid, and Judge W. H. Moore and his brother James H., who formed the tin plate trust, and John W. Gates, the organizer of the American Steel & Wire Co., and later of the Republic Iron Co. The former company was the nucleus of one of the Steel corporation's most valuable properties, while the latter was the beginning of what is now one of the strongest of the independent steel companies.

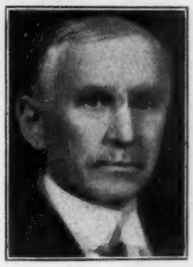
In his reminiscences of men and events "Uncle Joe" Butler, who was one of the pioneers of the pig iron industry in the Mahoning valley, tells a story of his visit to Gates, when "the plunger" was in the hey-day of his career. It was in Chicago and Gates took Butler to the races.

"Joe," he said, "if you really want to make some money, there's the horse to bet on."

"And sure enough," says "Uncle Joe," "the horse Gates pointed to won the race, and I lost an opportunity to make some money."

Gates lost a race, however, against time, in one of the greatest attempts of his career. The organizers in the West were bowing before the money power of the East, and J. P. Morgan was about to back Gates' enterprise with $80,000,000, when suddenly the MAINE was blown up, war came; capital became timid, and the deal was

Today's Captain of Industry



A preliminary step in making the composite

Several portraits were merged to make this

A FEW words in regard to the illustration on page 769 entitled "Today's Captain of Industry" may be of interest as it is a composite of some of the greatest of American industrial leaders, including E. H. Gary, Charles M. Schwab, James A. Campbell, James A. Farrell and Eugene G. Grace.

The individual photographs from which this was made are the so-called "three-quarters" portraits, all of them taken at practically the same angle.

As the first step in the making of the composite, negatives were prepared from the photographs, each negative of the same size, with respect to distance from the top of the subject's head to the base of his chin. Also, the negatives were made of practically the same light intensity.

The negatives then were superimposed on one another, two at a time so that detail would not be lost, and from these new prints and negatives alternately were made until all were merged in the one photograph representing "Today's Captain of Industry."

JOHN FRITZ, WITH HIS FRIEND, AMBROSE SWASEY AT THE LEFT IN THE ILLUSTRATION, AND S. T. WELLMAN, AT THE RIGHT, FROM A PICTURE MADE IN 1906. ALL THREE WERE THEN PAST PRESIDENTS OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

off; though Gates did succeed within a few months in organizing the steel and wire company with less than a third of the intended capital.

* * *

AN ERA of unreasonable competition tended to hasten the formation of steel combinations in the early years of the twentieth century. Some of the interviews and published statements by leaders in that period are similar to complaints voiced today against the uneconomic policy of selling steel below a margin of fair profit.

Although the ironmasters were shrewd business men, to the fierce competition of the times can be ascribed the reason why the names of many of them have disappeared as factors in the market. Theirs was a problem that has not been solved adequately to this day, and because of its persistence the new type of executive is being developed in the industry, more expert in selling, marketing and distribution.

Iron and steel requirements expanded and multiplied so rapidly production problems overshadowed all others; pressure for production dictated the selection of executives and managers, and brought into the industry or developed within it many of the country's ablest managers and engineers. They built the amazingly efficient superstructure on the foundations laid by the pioneer ironmasters.

B. F. Jones Sr., who died at the beginning of this era, in 1903, was one of those who had helped in founding the modern industry, his name still being identified with one of the largest independent steel manufacturers. The type of men who carried on with the work of the pioneers is exemplified in Willis L. King, the present head of the Jones & Laughlin Steel Corp. At the time of his selection as vice president and one of the original directors of the American Iron and Steel institute, Mr. King said:

"I feel we are entering the golden age of business; perhaps I should say the golden rule age, for that is what it means. All over the land there is a sentiment that the moral right of your neighbor is pre-eminent. His legal rights under the constitution do not measure your whole duty to him. He may be a competitor, or a consumer. It does not matter; he must be treated decently."

That occupied small space in the reports of the business affairs of the day; and yet it was one of the important enunciations of policy that has shaped the course of the majority of successful companies in the industry during the past quarter of a century. The same principle has been one of the guiding influences in the career of Judge Gary, a principle for which he fought, and pursuance of which probably saved his corporation from dissolution.

Judge Gary frequently has been referred to as "the statesman of the steel industry." He perceived and outlined a rational course for "big business" long before some of the statesmen of the political school rose up to challenge its right to existence. As the head of the steel corporation he did more than any other one leader in this 25 year period, first to set by example in the conduct of the corporation's business, precepts that squared with the American sense of justice; second to win for the industry the confidence of the people. It once was said by an associate of Judge Gary that a single decision of his was worth millions of dollars to the Steel corporation; it might have been said "to the steel industry," because some of his most important decisions have influenced the entire industry.

Up From the Ranks

This era of constructive development in iron and steel is notable for the large number of officials who came up from the ranks, in true American tradition. "Big business" never shut the door to the talents of young men, regardless of their origin. The reason many large companies have made special efforts to encourage their employes is that those companies today are in charge of men who not many years ago were merely employes.

Eugene G. Grace, president of the Bethlehem Steel Corp., was the son of a New Jersey fisherman. When Charles M. Schwab found Grace he was operating an electric crane in the Bethlehem mills at $1.75 a day. James A. Farrell, president of the Steel corporation, once was a day laborer. One day after he became the president he was on an inspection trip to the corporation's properties in the Connellsville coke region. He came to a coal mine where a serious cave-in had occurred. Large masses of rock and slate had fallen in the cross cuts and there was danger of other slips. A force of men were working to timber up and support the insecure walls and roof of the mine passage.

"I don't think it is safe for you to go down; we are having some dangerous cave-ins," said the mine superintendent as Mr. Farrell approached the mouth of the shaft and prepared to descend. "Our men are down there, aren't they?" was Mr. Farrell's quiet response, and down he went.

Beginning with Schwab, W. E. Corey, who succeeded him, and Farrell, third in line, the three presidents of the Steel corporation worked at some time with their hands in the yards and mills.

James A. Campbell, once a clerk,

now head of the third largest steel corporation in the country, is another example of the self-made man in this industry. He, like many others, advanced through various occupations in the offices, when the offices were much closer to the shops than now.

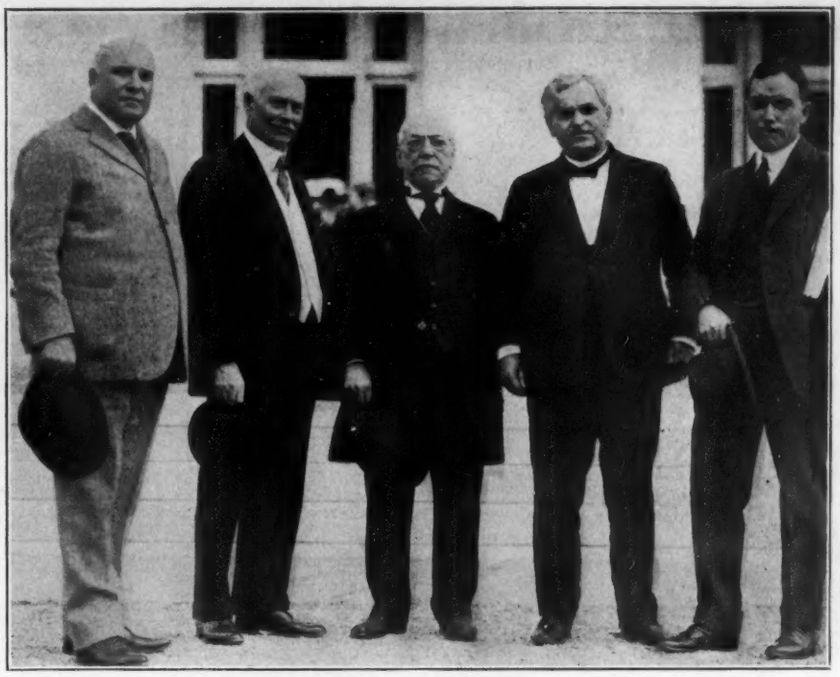
W. B. Schiller, president of the National Tube Co., started as an office boy and was a bookkeeper for the Brier Hill Iron & Coal Co. in 1883. C. W. Bray, who was one of the first presidents of the American Sheet & Tin Plate Co. and who made a fortune in that branch of the industry, began work as a draftsman. E. A. Longenback, of the United Alloy Steel Corp., Canton, O., who aided powerfully in building up the alloy steel industry, and who, by the way, received Henry Ford's first order for alloy steel, worked in a tin shop and peddled his wares.

The development of the Lake Superior iron ore industry, and Great Lakes shipping during this period also brought into national prominence many self-made men. H. G. Dalton, a partner in the firm of Pickands, helped in humanizing labor, and Mather & Co., mine and vessel operators, who was selected by President Coolidge last year to solve national shipping problems, once was a waterboy on the ore docks of Cleveland. H. Coulby, who resigned a few years ago as president of the Pittsburgh Steamship Co., Great Lakes vessel subsidiary of the United States Steel Corp., and who also is a partner in Pickands, Mather & Co., came to this country as a poor immigrant boy from England. He walked from Buffalo to Cleveland to obtain a position. Marcus A. Hanna, one of the pioneers in the development of iron ore, vessel and coal interests, began life in humble circumstances.

Few Born Wealthy

These are only a few of the innumerable instances that come to mind as one looks over the list of men who have made their mark in these industries in the past quarter of a century. Comparatively few of the outstanding figures were born in riches, or had their careers ready made for them.

The past 25 years has been a period of extraordinary opportunities for the man who could obtain results in the productive departments; who understood men and who could work with them "in the plant." That is where the principal development has been, and fortunately so, because in creating efficient means and methods for production this has helped in humanizing labor, and establishing better understanding of basic elements that always will remain the foundation of the iron and steel industry.



TALKING IT OVER AT WASHINGTON IN 1919

Leaders in the "First Industrial conference" called by President Wilson. Left to right: Franklin K. Lane, then secretary of the interior; E. H. Gary; Samuel Gompers; Frank Morrison, representing the American Federation of Labor and John D. Rockefeller Jr.

* * *

MANY important developments in the mechanical and metallurgical departments of the steel industry have come within the lifetime of the present generation of operators. The experience of some of the leading engineers span the greater part of the past quarter of a century.

Among the pioneers was Capt. Robert W. Hunt, who died July 11, 1923. To his mechanical genius is due many of the advanced methods and equipments; his contribution to the industry ranged from improvements in the bessemer process, to rolling mills, including the testing and inspection of steel.

To mention only a few of the names that stand out in this branch of the industry, there is James Gayley, who invented the dry-blast for blast furnaces; John Fritz, who devised rolling mill equipment, and his brother, George Fritz, who was a leader in the same branch; Samuel T. Wellman, who is known for his development of open-hearth furnaces; Alexander Brown, for hoisting machinery; J. E. Johnson Jr., for blast furnace construction; Herman A. Brassert, famous as a designer of blast furnaces; Julian Kennedy, another noted blast furnace and steel plant engineer, who designed many of the plants now in operation in the Shenango and Mahoning valleys; Arthur G. McKee, who has designed blast furnaces and steel plants now in operation in many countries, and who invented the revolving top for the distribution of ore in blast furnaces; Jas. Ramsey Speer, who perfected and patented an important alloy; E. L. Ford, who invented a mechanical puddler, and F. N. Speller, known for his development of tube making equipment.

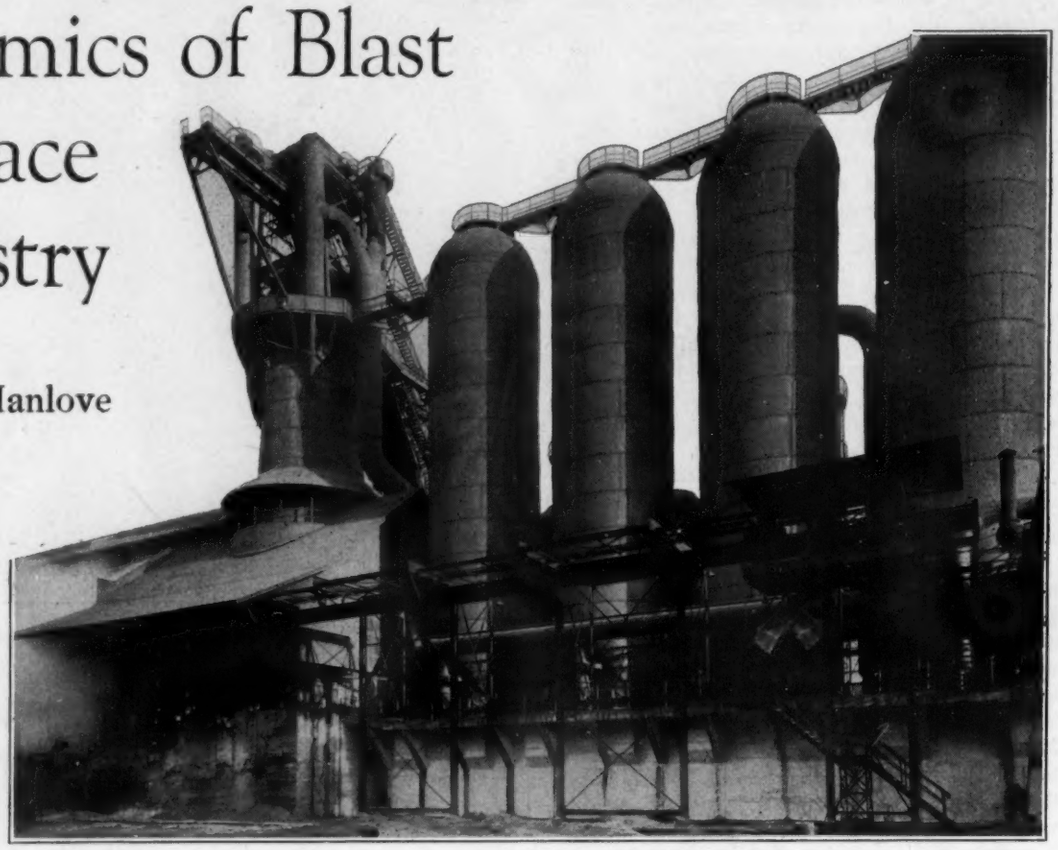
The executives of the Steel corporation's subsidiaries have been men with special ability for production. Among these may be mentioned E. J. Buffington, president, Illinois Steel Co.; William P. Palmer head of the American Steel & Wire Co.; George G. Crawford, president of the Tennessee Coal, Iron & Railroad Co.; August Ziesing, president, American Bridge Co., and W. B. Schiller, president, National Tube Co. An exception to this rule may be found in the fact that E. W. Pargny, now president of the American Sheet & Tin Plate Co., advanced from hte position of sales manager of that company.

The same has been true with respect to many of the leading independent steel manufacturing companies. To mention only a few of them there is Alvin C. Dinkey, once president of the Carnegie Steel Co., and now identified with the Cambria Steel Co., Alexander Glass, president, Whitaker-Glessner Co., George M. Verity, American Rolling Mill Co., John A. Topping, president of the

(*Concluded on Page* 793)

Revolutionary Changes Are Made in Economics of Blast Furnace Industry

By G. H. Manlove



Modern type of blast furnace. The Youngstown Sheet & Tube Co.'s stack at Indiana Harbor, Ind., completed in 1925

BROAD economic changes have developed in production and marketing of pig iron in the opening quarter of the twentieth century. In some respects the present position is diametrically opposite that of 1900. The period has been marked by cross currents of many kinds, the industry has shifted repeatedly to meet new conditions and at present stands on ground decidedly different. The elements of the situation have been fluid and have flowed with circumstances. They are not yet crystallized and further changes can be seen not far ahead, though the form they will take is difficult to foresee.

In production less change has taken place than in marketing. A fundamental process, susceptible to little revolutionary alteration, based on a chemistry whose broad lines were known from early days, pig iron can be produced only by freeing the ores from gases and gangue, leaving the iron in a relatively pure state and metallic form. This is done by heat in some form. Details of these processes may vary slightly but the process itself is much the same.

However, the surrounding factors, inseparable from the process, are subject to alterations in their relation to the matter of pig iron production. These shifts in relation may be swung half the circle. A plant may be built for the production of pig iron and in that process develop various by-products. Changes in the economic situation may cause these by-products to become so valuable that the plant will be devoted to their production and pig iron may become the real by-product, an incident to obtaining supplies of the other materials.

Becoming a By-Product

In fact, at the moment, pig iron promises in the present trend of the industry to become more of a by-product than ever before, the main object of the plants producing it being gas for domestic and industrial consumption. This development has been one of the interesting movements of the immediate past and its progress is being noted by the industry in an effort to forecast the situation facing producers who make iron for iron's sake.

The changes in the pig iron industry in the quarter century have been so varied and so intertwined with other industrial factors it is difficult to unravel and describe them clearly.

In 1900 blast furnaces existed for the sole purpose of smelting iron ore and producing pig iron for sale to those who would melt it for conversion into steel or for casting into iron objects. Some of the larger steel companies had their own stacks, the output of which they consumed in their own work. Relatively few steel companies were fully integrated and most bought their ore and their coke. The merchant furnace had no other business than to make pig iron and this was largely bessemer and foundry grades. It was smelted by the use of beehive coke, manufactured at the mine mouth. It was sold largely on analysis by fracture rather than by chemistry. Freight rates were low and furnaces shipped their iron widely. Rates were not determined by the interstate commerce commission and railroads made their charges low enough to assure moving the tonnage. Brokers familiar with local trade sold the iron for the furnace or bought it from the furnaces and resold it to consumers at a profit.

In 1925 the situation of the purely merchant furnace is somewhat precarious. Its former position is assailed by sales from steelworks stacks, Sunday iron or excess iron, above the needs for steel. The latter companies are fully integrated from ore to steel and all profits center in

one spot, reducing the cost of metal in the ladle. Merchant stacks find a steadily narrowing market among steelmakers. A new type of merchant furnace is coming into existence and threatening the business of the older type. It is built near some center of gas consumption. Its primary purpose is to produce and sell a large volume of gas from by-product ovens, the resulting coke being used to smelt pig iron, which probably will be produced regardless of the state of the iron market and demand.

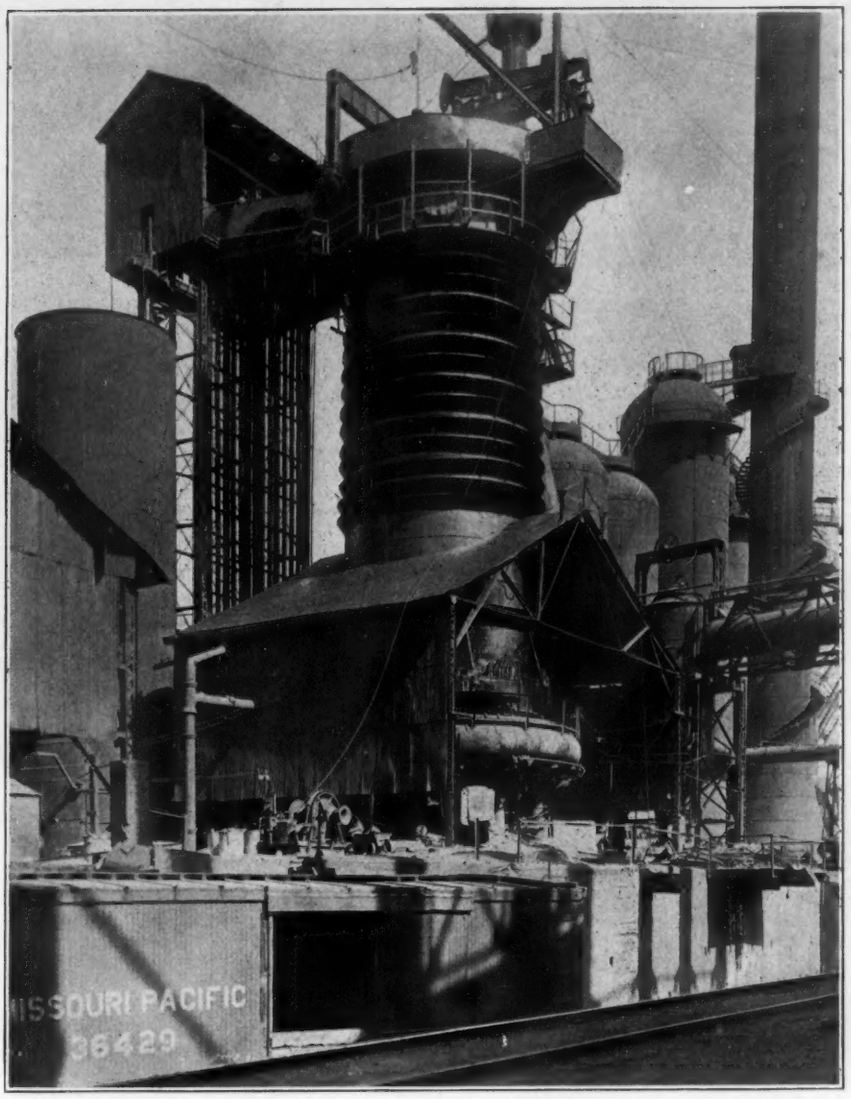
Iron now is smelted by the use of by-product coke made at the blast furnace and the valuable by-products saved and refined. It is sold by chemical analysis instead of fracture. Freight rates are relatively high and iron is shipped only in a restricted territory close to the point of production. The broker is less of a factor than formerly and sales are made by producers directly in a greater degree than formerly.

This contrast sketches broadly some of the changes that have come about in two decades and a half. It does not cover the subject completely.

Furnaces Greatly Enlarged

On the technical side there also have been many advances. The fundamental process is unchanged. Coke, ore and limestone continue to be charged into a furnace to which air is supplied under pressure and the iron is reduced. This is not subject to change in essence. But the size of furnaces has been greatly enlarged and daily output of a single stack has been increased amazingly. The small furnace has been outclassed by its larger competitor and is retiring from the field. Small stacks abandoned each year make an illuminating exhibit. Overhead on the small unit prevents profits at ordinary market levels. The annual production of the average blast furnace in the United States in 1900 was 53,864 tons, while in 1925 it was 121,578 tons. At the same time the world production of pig iron increased from 40,000,000 tons to 75,000,000 tons.

The form of the furnace has been changed somewhat to obtain larger output. Good practice in blast furnace building in 1900 produced stacks 107 feet high, with hearths of 13 feet 6 inches to 14 feet 6 inches, while present practice gives stacks about 92 feet high and hearths about 21 feet in diameter, the bosh diameter being about the same in both. The dry blast was tried but did not gain wide application. The thin-lined furnace had its day and its firm advocates, but did not retain its hold.



A blast furnace of two-score years ago. The hand charger, and spiral water-cooled collar around a thin lining were the features of this stack of the Colorado Fuel & Iron Co.

The gas from the stack is collected, washed, burned in stoves or under boilers and all the dust collected. This is prepared by various processes of sintering and charged back into the furnace. Slag, formerly a waste for the disposal of which the furnace paid, now is sold for the production of cement or for use as an aggregate in concrete. Materials are handled by gravity and conveying devices instead of by hand.

Even these changes in method and mechanical practice have come about largely through the economic pressure to meet or balance conditions existing in that sphere. Transportation and labor charges have increased steadily and materially, thus adding to the cost of ore, coke, limestone and general supplies, and the cost of labor at the furnace is also much larger. Thus to meet increases outside the immediate industry costs were reduced within the industry as far as possible.

Of less importance, since it involved only a change in the grade of iron produced, the shift from bessemer to basic iron in this quarter century in interesting as reflecting the change in process of steel production. Prior to 1912 bessemer iron far exceeded basic in total production but in that year the two came to a practical equality and since then basic has steadily increased its lead over bessemer. This came about because of the enlarged use of the open-hearth furnace and the relatively smaller use of the bessemer converter. Statistics of production of these grades are presented on page 796.

This was an economic movement based on the necessity for quantity production in units that could handle

(*Concluded on Page* 793)

Steelmakers Improve Practice

Methods, Equipment Are Changed Gradually During Quarter-Century of Refinement

By J. D. Knox

DEVELOPMENTS in the steelmaking and rolling mill industries during the past 25 years have made possible a practical annual output of steel ingots in this country in excess of 45,000,000 gross tons. The progress made in producing common and special steels has been equaled by rolling mill engineers who have given the industry mills and subsidiary equipment capable of handling the national output of steel.

Principal Developments in Steelmaking 1900—1925

DUPLEX process introduced. Tar, coke-oven gas and combination of two utilized as open-hearth fuel.
Electric furnace introduced and applied commercially on important scale.
Copper in steel recognized as valuable in reducing corrosion.
Alloy steel industry expanded to imposing proportions.
Blair-type reversing valve developed.
Electric soaking pit installed.
Mechanical puddling furnaces placed in service.
Mechanical gas producers undergo rapid change of construction.
Waste heat boilers adopted.

During the period of open-hearth development from 1900 to the present, many devices have been brought out, but despite these improvements and the fact that the units have been built along larger and more substantial lines, the past 25 years has witnessed no drastic change in the construction of open-hearth furnaces. While the time required to make a heat of open-hearth steel is practically the same now as it was 25 years ago, present-day equipment permits a larger tonnage to be worked.

During 1900 the United States for the first time made more open-hearth steel than was produced by Great Britain. In the early part of the century about one-third of the total steel produced in the United States was of open-hearth quality, while about four-fifths of this tonnage was made by the basic process.

The year 1904 may be considered an important year in open-hearth development as it marked the introduction of the duplex process in this country. This process was inaugurated by the Tennessee Coal, Iron & Railroad Co., which employed a 10-ton acid bessemer converter and the basic open-hearth furnace and afforded the first large scale production of basic open-hearth steel for rails yet undertaken by American steel producers. During this year tar was used for the first time in America as a fuel for openhearths. The following year the use of oil as fuel for open-hearth furnaces showed a considerable increase.

Titanium first was used as a scavenger for molten steel intended for rails in 1907. About this time the United Alloy Steel Corp., then known as the United Steel Co., began the manufacture of vanadium and chrome-vanadium steel in open-hearth furnaces. This beginning of operations was noteworthy since it marked the introduction of alloy steel manufacture on a large scale.

Metallurgists in about 1912 discov-

Principal Developments in Rolling Steel 1900—1925

ROLLED steel carwheel developed by Charles Schoen at McKeesport, Pa.
Mills largely electrified.
Grey-type structural mill introduced.
Mechanical doublers adopted.
Automatic tin pot feeder installed in many plants.
Electric roll heaters adopted.
Open-top housings for mills developed.
Universal couplings for mill spindles adopted.
Mill tables provided with self-oiling bearings.
Continuous heating furnaces designed with gravity discharge.
Notched-type cooling bed devised.

ered that the use of copper in steel lessened corrosion and since then copper bearing steels have gained prominence. During 1915 steel manufacturers began to give more attention to the utilization of the waste heat from open-hearth furnaces. Enlargement of steelmaking capacity during the following year exceeded that of any previous year.

The development of the mechanical gas producer from 1900 to 1918 was comparatively slow, but from this year on rapid development occurred. The improvements in mechanical gas producers since 1918 have included automatic coal feed, automatic agitation of the fuel bed, automatic agitation of the ash zone and automatic ash discharge. While the electric soaking pit was developed in 1918 its introduction into the steel industry was delayed for seven years.

Fuels Used in Combination

Tar and coke oven gas as a fuel was introduced in 1919. This combination proved to be more satisfactory than the use of coke oven gas containing benzol, or the use of tar alone. From 1920 to the present time open-hearth superintendents have been giving their attention mostly to the pouring of steel and to ways and means of improving the product. One of the most recent developments is the electrical heating of the tops of ingots to reduce wastage.

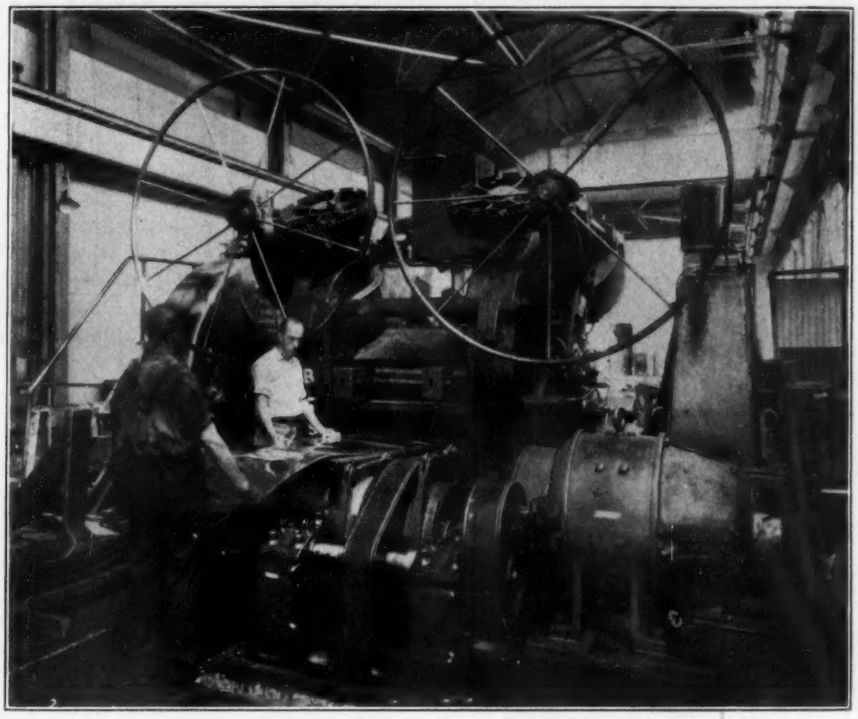
The past 25 years witnessed the introduction of the electric furnace into the iron and steel industry. The development of this process of steelmaking has been steady until today its usefulness is demonstrated by the large number of installations in this country and abroad. The first electric steel made in the western hemisphere on a commercial scale was produced at the plant of the Halcomb Steel Co., Syracuse, N. Y., on April 5, 1906. The next company to adopt this process of steelmaking was the Firth Sterling Steel Co., Washington, Pa. The third installation was at the Illinois Steel Co. and the fourth at the American Steel & Wire Co. Worcester, Mass. Later in 1906 Henry Disston & Son, Inc., began to melt steel electrically at their Tacony plant, Philadelphia.

Development of electric steel at the South Chicago works of the Illinois Steel Co. was undertaken by reason of the fact that this method permitted the manufacture of carbon and alloy steel on a quality basis. The method also was looked upon with favor because the steel could be produced in sufficiently large quantities to permit its use in heavy products. At the time the first electric furnace was installed at the South Chicago works the furnaces in the United States and foreign countries had a capacity ranging from 1 to approximately 5 tons. The South Chicago installation consisted of a 15-ton heroult-type basic-lined unit and at that time it was the largest electric furnace in existence.

By 1910 the use of electricity for the refining of steel became established among metallurgical processes. By 1915 capacity built or under construction in this country afforded an annual output of 450,000 tons, this figure representing an increase of approximately 100 per cent over capacity available the previous year.

The furnace is equipped with a double lining with air space between and is designed with five air-operated doors.

Progressive development work, which has been accomplished in rolling mill construction during the past 25 years, has included the design of the blooming mill, the screwdown mechanism, the adoption of universal couplings for mill spindles, the design of mill pinions and pinion housings, mill tables with self-oiling bearings, table gears running in oil, etc. About 1900 the continuous heating furnaces were improved by the gravity discharge arrangement at the delivery end, and this particular type furnace came into general use for various kinds of merchant mill work.



AS THE QUARTER CLOSED, MANY NEW IDEAS WERE BEING TRIED OUT. THE CLUSTER-TYPE MILL SHOWN IS TYPICAL

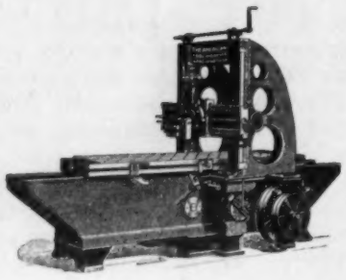
Until 1916 the largest proportion of electric steel made in the world was produced in Germany. But during this year the United States obtained first position in the production of electric steels of the world. Expansion in the industry was featured by the rapid strides made by the arc-type units. In 1917 the largest electric steel plant in the world was started at the South Chicago division of the Illinois Steel Co. At the close of 1919 the electric furnace industry of this country had grown to include 325 installations.

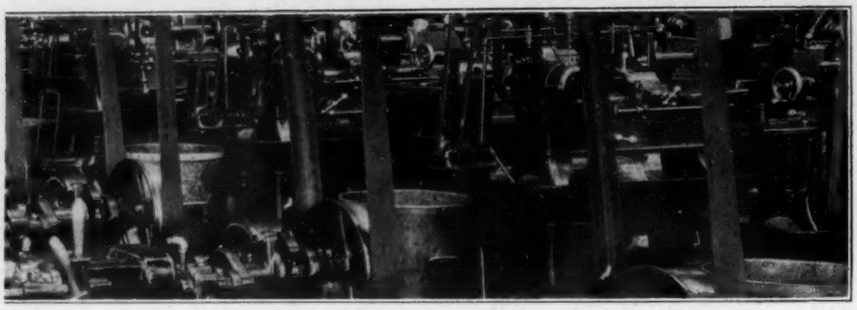
That the electric furnace is not confined to small melting units for high-grade steel is shown by the 60 to 80-ton furnace installed by the Ford Motor Co. last year. This furnace is 16 x 20½ feet, inside dimensions, and is built of 1-inch steel plate. Shortly after the development of the continuous roughing train, the notched type mechanical cooling bed began to be used and this permitted rolling longer bars.

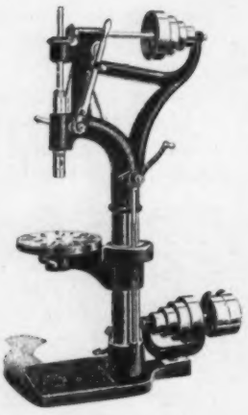
In 1902 a 34-inch blooming mill was considered a good standard size. The extent to which rolling mill design has progressed since then is readily understood when the blooming mill of 1902 is compared with the 44-inch blooming mill completed during 1925 at the Homestead works of the Carnegie Steel Co. The 44-inch mill will handle an ingot weighing 16,000 pounds, whereas a 7000-pound ingot was the maximum size handled by the earlier type unit.

Probably no other industry of this

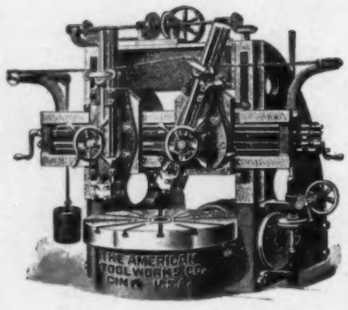
(*Concluded on Page* 800)

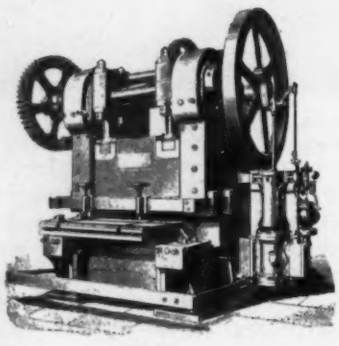


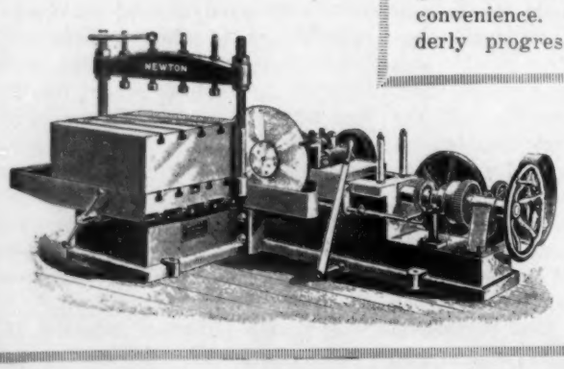




Machine Tool Design of Refinement







FOR several hundred years machine tools have been the servants of man, consequently at the opening of the twentieth century, this equipment had reached a relatively high plane of development. The 25 years which have just passed, therefore, constituted a period in which the improvement and refinement of existing tools was the principal aim. The process of evolution has gone on slowly but each year added its bit to the steady improvement.

Going back to 1900 and 1901, one finds that all important types of machines were in existence and basically the tools of today closely resemble those of yesterday. Simplicity of outline and smooth round corners have replaced the square corners and the modern unit reflects a more even balance of one part to another and one machine to another. The present day machine tool, while essentially the same as 25 years ago, is far more pleasing in its appearance. To be sure, rounded corners and other curves have complicated pattern making, but they have facilitated molding practice and been an aid in the production of better castings.

A quarter of a century ago machine tools were designed without due regard for speeds and feeds, pulley and gear sizes being made a matter of convenience. Advantages of some orderly progression of speed increases was recognized, consequently it was but a short time until the geometric range was developed and its adoption has been a distinct advance. Cutting rates now can be regulated to suit the material, operation and cutting tool, providing equipment of maximum flexibility.

High speed steel first was introduced in 1900 and immediately it found wide use for the making of cutting tools. Steel available previous to that time necessitated slow operating speeds, for the heat generated at the cutting point frequently was sufficient to cause tool failure. With the newer high speed steel, tools were capable of withstanding considerably higher temperatures and required regrinding less often. Thus, designers were able to speed up machines to rates far in excess of those considered common practice. Early observations gave rise to the belief that machines utilizing high speed tools would have to be completely redesigned to accommodate the more severe cutting strains, but tests proved that existing models were sufficiently heavy to take care of the loads safely.

Cutting Rates Are Increased

The problem, therefore, was to increase speeds to the point necessary to use the new tools advantageously. Attention of designers was applied to the improvement of bearing surfaces, lubrication and gearing in particular, since higher speeds were conducive to excessive gear breakage. While some authorities believe the strengthening of machines was due directly to the introduction of high speed steel, others attribute the development of heavier and more powerful units to the increased knowledge of the art of cutting metals. Regardless of the cause, tendency of design in the last 25 years has been toward higher and higher cutting rates and the achievements in this direction have been a principal contributing factor to the efficient mass production distinctive to American industry. One has but

Passes Through Period

By E. F. Ross

to think of the automobile industry to realize the paramount importance of high production machine tools.

Up to the beginning of the present century, most machine tools employed a countershaft and therein lay the difficulty when higher speeds were applied. It was soon proved that large lineshaft pulleys and high speed belts were disadvantageous. The next step in the march of progress, therefore, was the elimination of the countershaft and in its place the all gear, or single pulley drive was introduced. This type of drive was particularly advantageous from the point of view of power supply for it meant that a given machine required a definite and constant power input. Where tools were not equipped with single pulley drive, a slowing down of operating speeds resulted in an increasing torque until at a maximum, the torque developed was sufficient to result in the inadequacy and disintegration of driving mechanisms.

Single Pulley Drive Developed

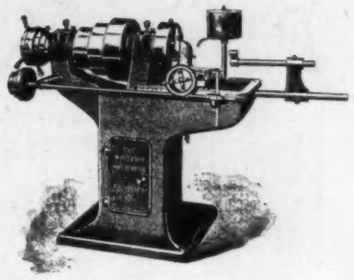
Here again engineering ingenuity came to the front and the single pulley drive was the answer. Materials of construction were improved as increased wearing qualities and greater resistance to strains became imperative. Steel gears were employed more generally to bear the heavier pressures. Heat treatment, rapidly becoming a science of extreme importance to the metals industry, was resorted to and various parts were hardened to increase tensile strengths and to withstand abrasion. Bearing metals were investigated and perfected until breakdown from that source was minimized. After a brief period of trial, the single pulley drive was declared a success and on belt driven machines, its use today is considered standard.

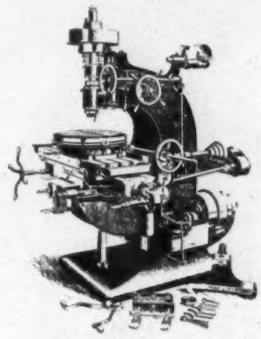
Manufacture of castings has undergone much improvement in the last quarter century, this applying to steel and malleable as well as gray iron castings. Tensile strengths and resistance to impact have been raised appreciably and the application of heat treatment has reduced brittleness and provided a higher degree of toughness. All this has influenced machine tool construction, for designers were able to obtain desired strengths using castings of lighter section and yet sacrifice none of the rigidity essential to metalworking tools.

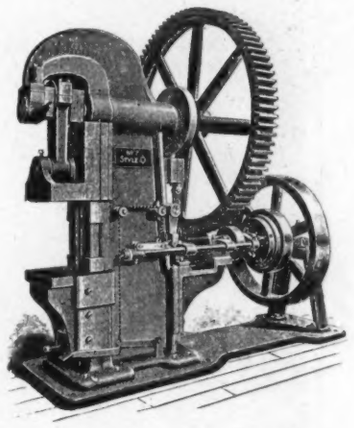
Some of the improvement in machine appearance must be attributed to castings development, for the most part, square box-type lines being replaced by pleasing curves and well rounded corners. Whereas once gray iron castings were used throughout, now various types of castings are used in various places, dependent upon the requirements of strength. Softer metals are employed where machining properties are desirable and where strength is not important, and harder metals where surfaces are subjected to wear and abrasion. Chilling of surfaces is resorted to frequently to obtain close grained wear resisting metal.

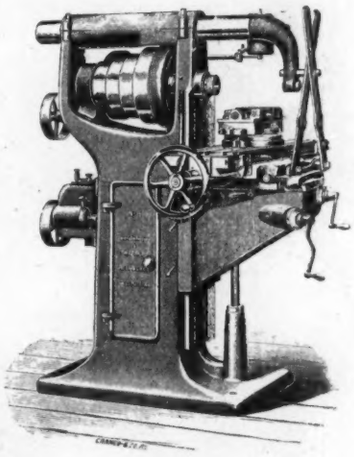
Application of ball bearings in machine tool construction was first noted in 1906, or 20 years ago, but the practice has extended rapidly. High speed shafts were one of the first parts of a machine to be equipped with this type of bearing, the change being forced by the fact that

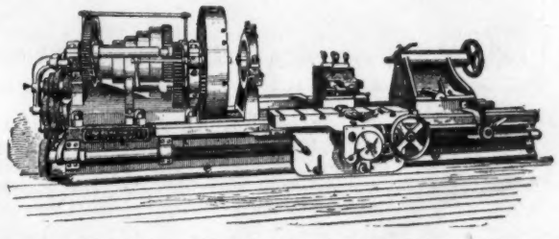
(*Concluded on Page* 800)



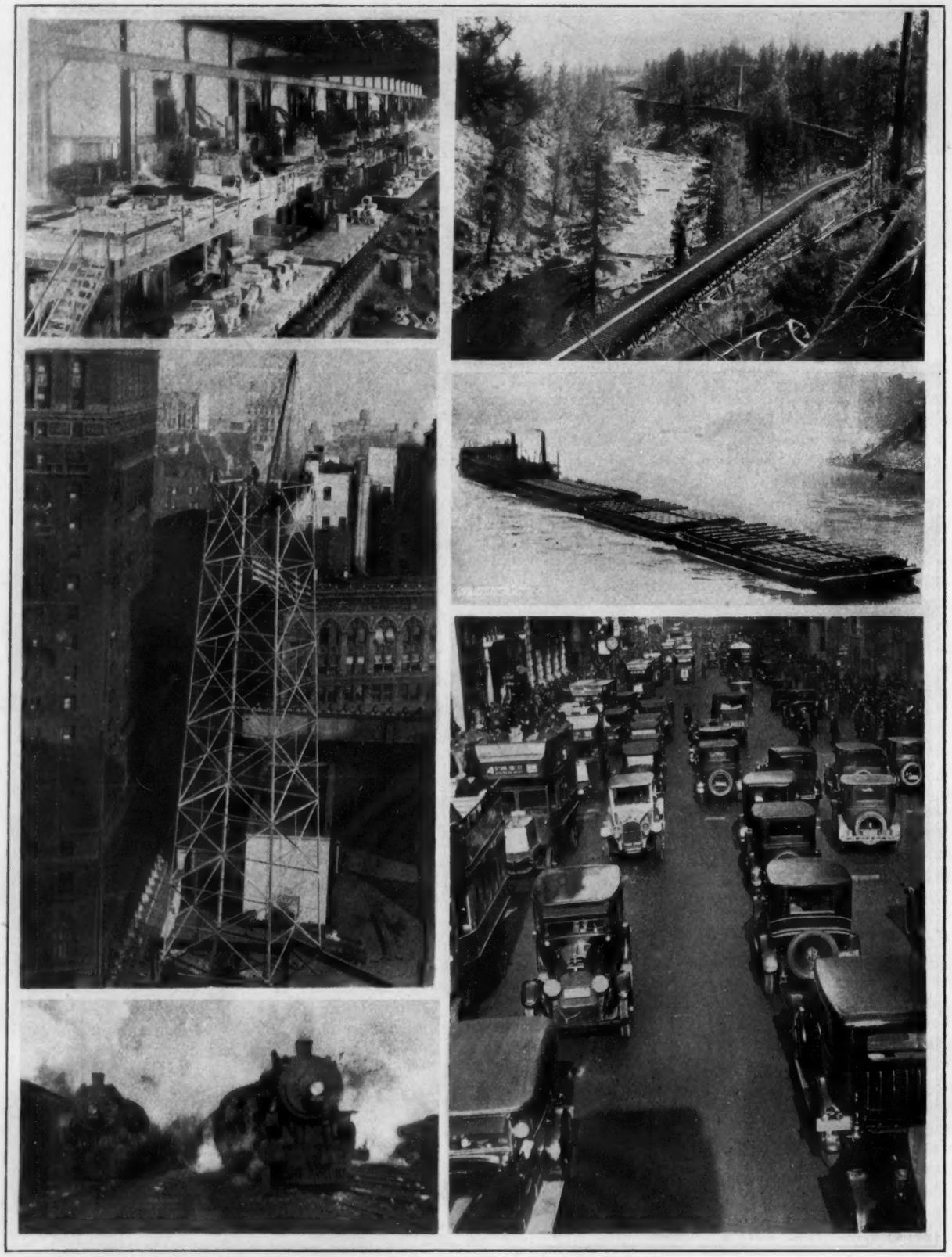






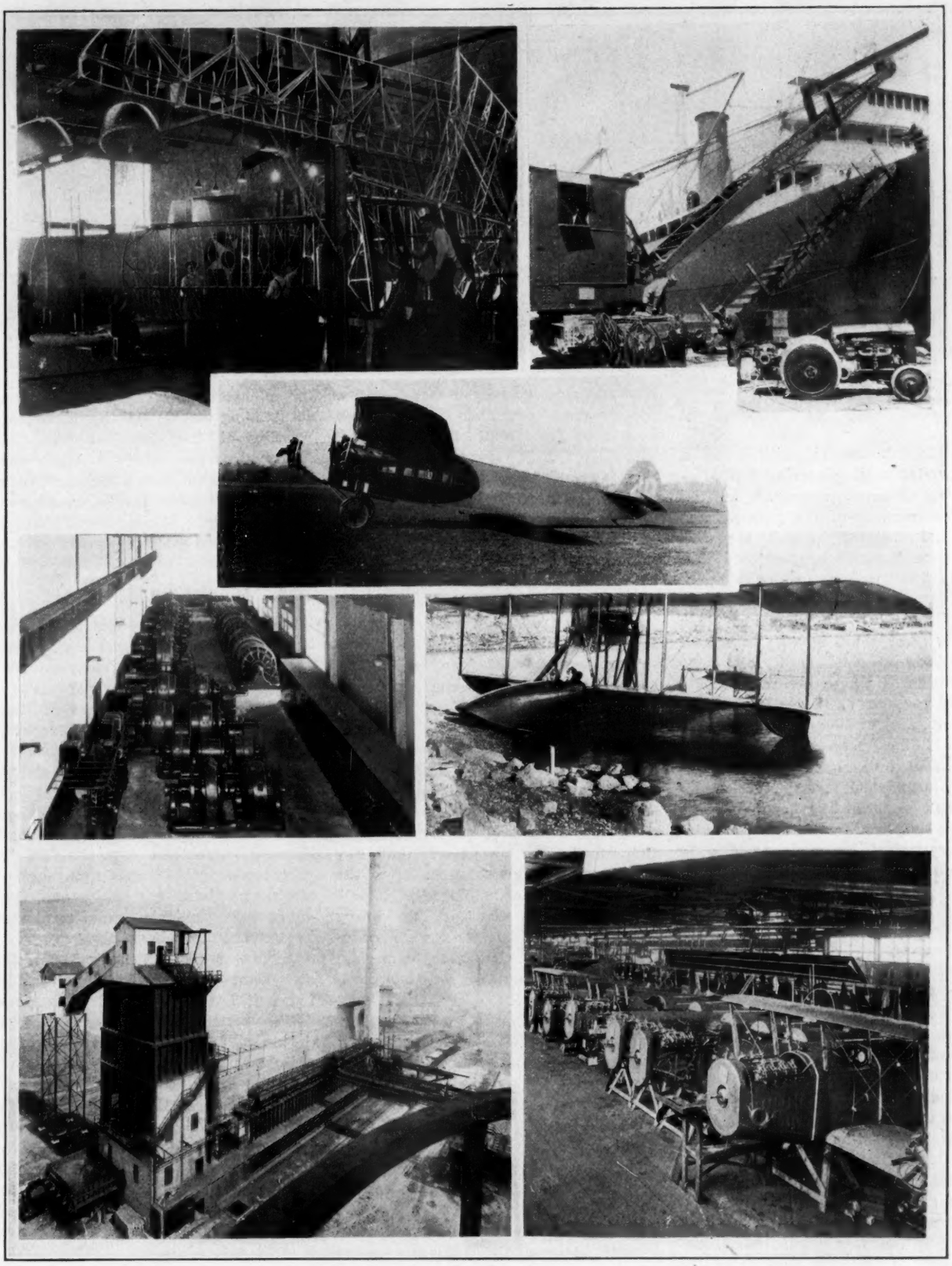


Pictures Show Prominent Role of Steel in Qu



PRACTICALLY everything shown above is a product of the past quarter-century. The battery of electric furnaces represents a development largely within the 25 years. Irrigation projects of the West were of this period. The scenes on the Ohio river and on Fifth avenue, New York, indicate the status of the automobile. The radio was created and developed in the quarter-century. The illustration of the locomotives is from a photograph sent by wire—an achievement of the final year of the period.

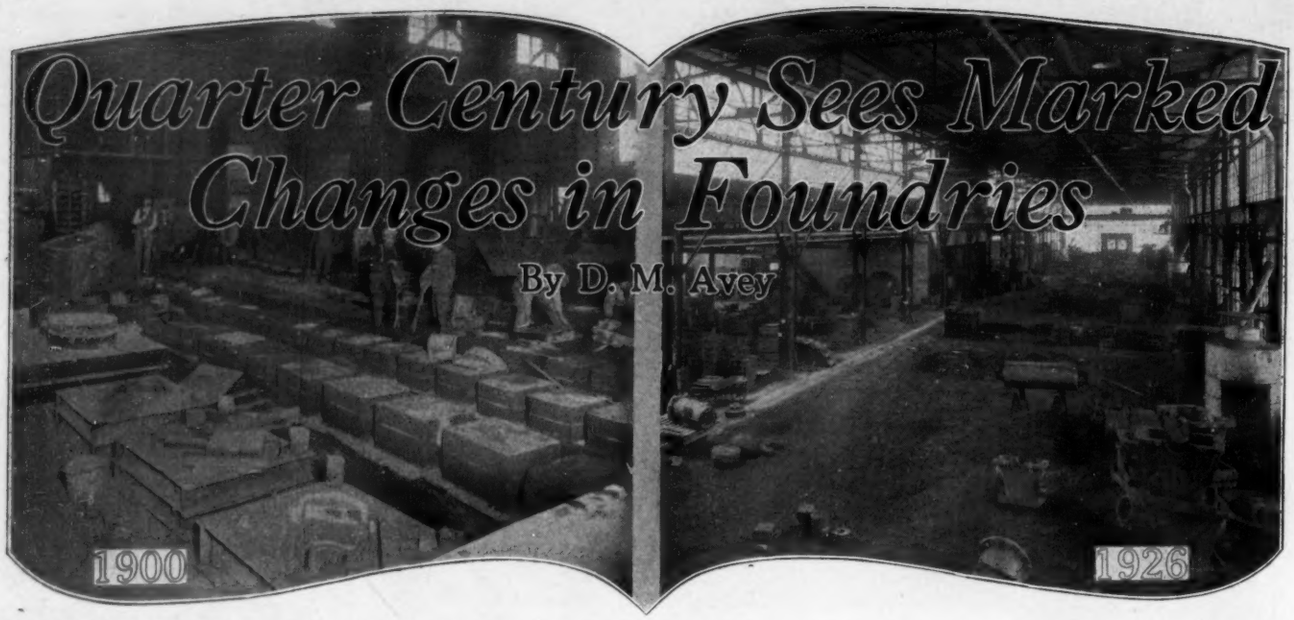
Quarter-Century of Industrial Progress



FOUR of the above illustrations indicate the phases in the development of the airplane—one of the important achievements of the quarter century. Great strides have been made in material handling in that period, as witness the modern equipment shown in the upper right hand corner. Electrification of the iron and steel industry and growth of the by-product industry are suggested by the remaining illustrations.

Quarter Century Sees Marked Changes in Foundries

By D. M. Avey



"Shall not the next 25 years see similar wiping out of hundreds of small foundries with their cupolas, which now encumber the ground?"

THIS statement credited to a writer in *Engineering and Mining Journal* appeared in the first few months of the present century and aroused caustic comment from prominent foundrymen of that period. The writer's remarks were made in commenting upon the lack of initiative which led foundrymen to remelt all their metal, instead of establishing their shops alongside blast furnaces where hot metal could be used to pour castings direct. The same attractive idea occurs periodically. It has been tried by many independent investigators, not excepting an automobile manufacturer credited with quite a little acumen, who thought he had found an elemental fact overlooked by everyone else in the foundry industry.

Cupola Still Supreme

To the confusion of all these expert observers and occasional prophets from without the industry, the foundry cupola with a few minor modifications from time to time, continues to perform its appointed task, melting iron most economically for certain classes of castings. Hundreds of gray iron foundries may have passed out of the picture, but not for the reasons stated by this prophet of 1900. In the meantime, hundreds of others have taken their places, larger shops are in existence today and the practice of castings manufacture has kept pace with every other industrial development of the first quarter of the twentieth century.

To an observer within the industry, one actively interested in castings manufacture only in recent years, the progress which has been made cannot be fully appreciated. If such a one could be translated back to the days of 1900 and placed in an up-to-date foundry of the period, a plant which embodied the last word in every phase of management, construction and method of operation, the marked change from that day to this would be so apparent as to warrant the use of the term, revolutionary.

The very type of foundry building was radically different the early part of this century. True, brick construction predominated then as now, but the wide pilasters, comparatively narrow window space, the framed wood or steel roof trusses and the absence of roof sash, now so essential to good lighting and proper ventilation, made the shops of that day dingy, smoky and disagreeable to the workmen therein employed.

Cranes were necessary in heavy work foundries, but they were mainly of the most elemental form. Jib type cranes, mounted on inner columns or upon the outer walls were hand operated or actuated by hydraulic power. The electric crane, so essential today was a novelty in the early part of the present century. Warm arguments occurred in the meetings of foundrymen, as to whether electric cranes could be stopped when set in motion. One prominent foundryman went so far as to advocate leaving all brakes off such cranes for fear of what might happen to motors, driving mechanism and girders if someone applied the brake injudiciously.

Molders of 25 years ago must have possessed the eyesight of cats or the groping sense of moles judging from the character of their work and understanding as we do the inadequate lighting of the shops of that day. A few drop cord electric lights were used, but gas and acetylene flares were in common use to supplement the feeble light which filtered through scanty panes of dirty glass in the limited window areas.

Machines Were Crude

Although molding machines had been invented and patents were granted on crude models as early as 1852 and a stripping plate machine for making pipe was announced in England early in the nineteenth century, the use of such machines was extremely limited in 1900. Those which were available were plain machines upon which the flasks were placed and the sand was rammed by hand. Some of them had a mechanism for withdrawing the pattern through a stripping plate, and only one type of squeezer machine was mentioned in current foundry literature.

A few types of sand preparation equipment were available. A revolving, belt-driven, octagonal riddle, forefather of the multiplicity of power driven sieves, riddles and screens of today was the first emancipator offered molders from the backbreaking drudgery of the hand riddle. The early sand mixers were modified forms of the dough mixers used by bakers and probably the first type of sand preparation unit was made by a company which specialized in baking machinery. One centrifugal sand aerator was available.

The first types of pneumatic chipping chisels were offered early in the present century. The first heavy, cumbersome, pneumatic rammer in use in those days resembles but lit-

The author is editor, *The Foundry*.

Table I

Total Pig Iron and Foundry Iron Produced

1900-1925

Year	Total pig iron	Foundry iron	Percentage foundry to total	Year	Total pig iron	Foundry iron	Percentage foundry to total
1900	13,789,242	3,376,445	24.4	1913	30,966,152	5,220,343	16.9
1901	15,878,354	3,548,718	22.2	1914	23,332,244	4,533,254	19.4
1902	17,821,307	3,851,276	21.6	1915	29,916,213	4,843,899	16.2
1903	18,009,252	4,409,023	24.5	1916	39,434,797	5,553,644	14.1
1904	16,497,033	3,827,229	23.2	1917	38,621,216	5,328,258	13.8
1905	22,992,380	4,758,038	20.8	1918	39,054,644	5,145,260	13.1
1906	25,307,191	4,773,011	18.6	1919	31,015,364	4,916,758	15.8
1907	25,781,361	5,151,209	20.0	1920	36,925,987	5,957,782	16.1
1908	15,936,018	3,637,622	22.8	1921	16,688,126	2,568,136	15.4
1909	25,795,471	5,322,415	20.8	1922	27,219,904	3,976,431	14.5
1910	27,303,567	5,260,447	19.3	1923	40,361,146	6,470,013	16.0
1911	23,649,547	4,468,940	18.9	1924	31,405,790	5,623,124	17.9
1912	29,726,937	5,073,873	17.1	1925*	19,158,350	2,867,630	15.0

*First half only.

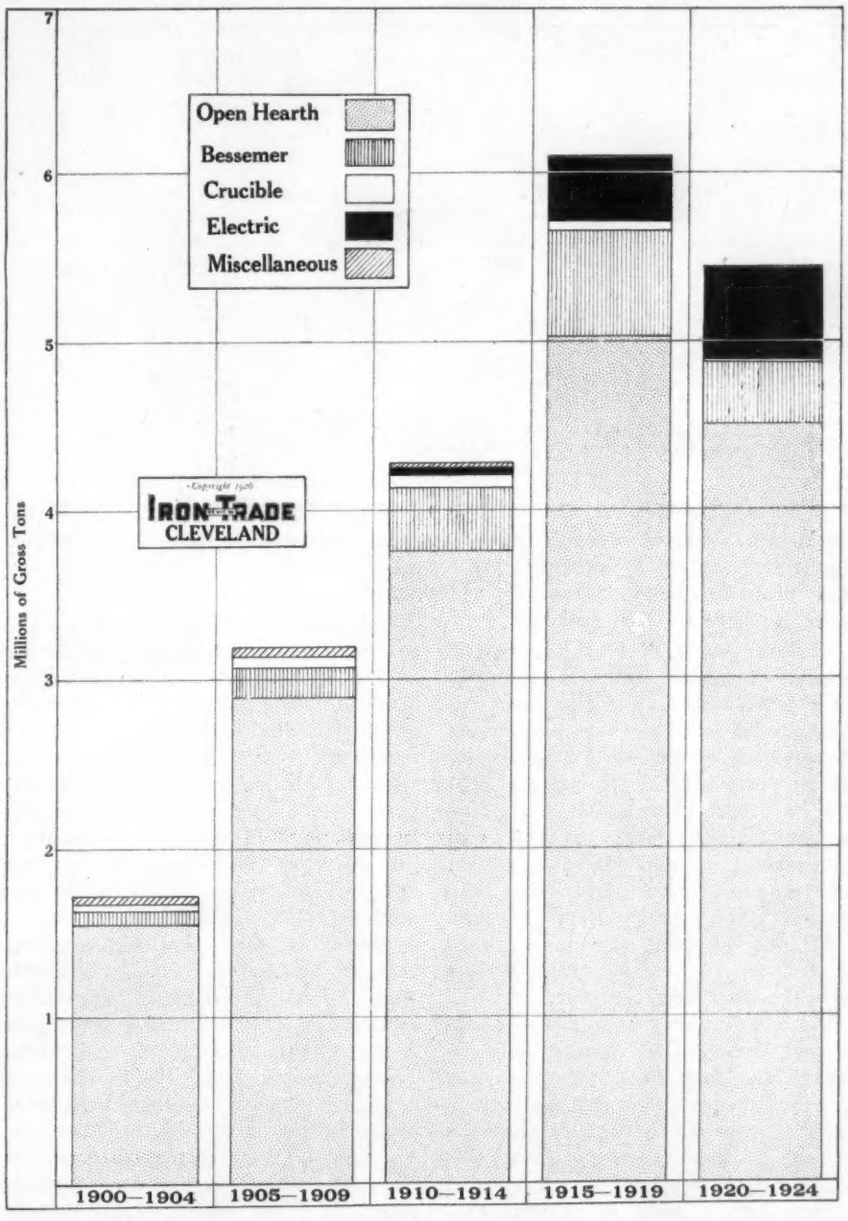
tle the light efficient tools in service today. Sandblast machinery was simple and crude as compared to the present types of complete units. The sandblast of 1900 was little more than a tank, with air pressure connections through which sand and air were driven through a hose to a nozzle with an action similar to that of an atomizer. The revolving tables, enclosed sand-blast rooms, elaborate reclaiming and dust removal accessories and the combined tumbling-barrel, sandblast machine were entirely unknown 25 years ago.

Briefly stated, the greatest strides in foundry practice during the first quarter century have been in mechanical equipment. Heavy hand labor performed practically all operations in 1900, while today mechanical aids have speeded up and rendered more efficient every step in castings manufacture Practically every modern foundry has at its command and uses machinery for handling its sand and metal; for sifting, mixing and blending its sand for molding; for making its molds, lifting and shifting heavy flasks and equipment; for charging its furnaces, handling and pouring its molten metal; for removing its castings and wasting or reclaiming sand; for cleaning, handling and loading its castings for shipment. These operations with few exceptions were performed by manual labor in the early nineteen hundreds.

Quality Greatly Improved

The past 25 years have seen even more remarkable developments in metallurgy and in the quality of castings made available for industrial service. Scientific advance has been made in practically every branch of the foundry industry, whether ferrous or nonferrous metals are used. The period in question has seen advances in gray iron, the pioneer metal from which castings always have been made for a wide range of industrial uses. The mixing of iron by analysis, instead of by rule-of-thumb, the production of special grades of iron ranging from the glass hard, high silicons found in acid resisting castings to the machineable, tough product secured by alloying, have marked the past 25 years as noteworthy in gray iron foundry practice. Wide use of steel scrap melted with iron in the cupola has given a high quality metal unknown in 1900.

No production figures are available upon which to base a comparison of the total tonnage of iron castings made through the various years under consideration. An approximation might be offered from the total production of foundry iron made by blast furnaces throughout the country in these years. How-



STEEL CASTINGS PRODUCTION MADE HEAVY GAINS IN THE QUARTER CENTURY

ever, it must be remembered that these production statistics do not take into account the large amount of cast iron and steel scrap which has gone through the cupolas of America's foundries in the period in question, nor the total tonnage in stock in foundry yards, nor the various other grades such as malleable.

The production of foundry iron, the total output of pig iron and the percentage of the total production represented in foundry grades from 1900 to 1925 are given in Table I accompanying. It will be observed that the ratio of foundry iron to the total production of all classes of pig iron has been declining. Of course the output of iron has mounted to a surprising degree during the past 25 years, so that it is probable that more gray iron castings are produced today than ever before, but the consuming capacity of the country is larger and other kinds of castings, rolled and other fabricated products probably have advanced and taken a share of the business.

A closer study of steel castings is possible through statistics compiled by the American Iron and Steel institute. These show the remarkable development of the steel castings industry from a total tonnage of 192,803 in 1900, through the peak output of 1,458,031 tons in 1923 with an average of well above a million tons a year. This period has seen crucible steel castings start at around 4000 tons annually, rise to a record of over 20,000 tons and then decline to about 1000 tons per year.

Electric furnaces have been invented and perfected in this period. Although the first electric furnace was put into operation in this country in 1906, it was not until 1909 that the output of steel castings from this melting unit reached the dignity of representation, with an annual tonnage of 306. The growth in favor was gradual, until 1923 established a record of 235,958 tons.

Bessemer converters grew steadily in the regard of foundrymen until a production of 160,844 tons in 1918 set the high mark. Since that time a decrease in production of this class is noted, but for certain kinds of work, this type of melting unit probably will maintain its position.

The open-hearth furnace has been the largest single factor in steel castings production. The graph on page 783 visualizes the growth of steel castings production through the first 25 years of the century. Totals of the tonnages produced by the different processes have been plotted, arranged in periods of five years each. From 1915 to 1919 covers the time when America was bending every effort to produce war materials and when steel castings were in urgent demand. The five years from 1920 to 1924, inclusive, marks the post-war expansion and the return to normal conditions.

Malleable iron castings have experienced many vicissitudes during the period from 1900 to the present. Malleable foundry practice at the start of this period was shrouded in secrecy and each maker of malleable regarded his method as a proprietary process to be guarded from the world. In 1903, H. E. Diller, late metallurgical editor of *The Foundry*, and an authority on malleable, described the methods and products of malleable foundries of that day. He reported that 40,000 pounds tensile strength was perhaps the highest obtainable, although a slight increase over this figure might be attained with care. Losses ranged from 10 to 20 per cent and in most cases probably were closer to the latter figure. However, he saw a brighter future for this class of castings, remarking prophetically, "yet as specifications become more severe, general quality will be improved until we get a more reliable article."

This is exactly what has transpired. Malleable castings manufacturers diagnosed their own ills, prescribed their own treatment and by a rigid system of self-imposed inspection, coupled with an interchange of ideas, they have produced a uniformly reliable product widely favored for railway, automotive and other severe services. The standard specifications of the American Society for Testing Materials, today call for a tensile strength of 50,000 pounds per square inch, with an elongation of 10 per cent. Where only 95 foundries were making malleable iron in 1900, probably 250 now are producing dependable castings.

Table II

Total Number of Foundries in United States and Canada

(From Penton's Foundry List)

Year	Total No. foundries	Total No. gray iron foundries	Total No. malleable foundries	Total No. steel foundries	Total No. nonferrous foundries
1900	6017	.....	95	51	.....
1902	5116	.....	102	72	.....
1906	6108	4956	125	156	2432
1908	6366	5105	153	211	2799
1910	6594	5157	178	265	3558
1912	6538	4943	190	318	3680
1914	6507	5057	214	318	3632
1916	6290	4724	213	332	3447
1918	6444	4787	268	426	3472
1920	6516	4857	267	449	3482
1922	6733	4854	274	409	3542
1924	6475	4564	229	374	3574

Nonferrous Advanced

Nonferrous foundries have increased both in numbers and in the total productive capacity during the past 25 years. No statistics are available which will give the latter, but the listing of plants compiled each two years and published in *Penton's Foundry List* shows the latter to be true. The total number of foundries in the United States and Canada are given in the accompanying Table II. A tendency of the past few years has been to larger plants, making specialties on a production basis. Automotive demand also has led to the construction of nonferrous casting plants of greater capacity.

Melting units employed by brass foundries have undergone a number of important changes during the first quarter century. The pit-type, crucible furnace still is employed to a great extent, but coal and coke have been displaced by oil and gas as fuel. Many new types of crucible and noncrucible furnaces for melting brass and aluminum have been developed and these have been supplemented in the larger production shops by various types of direct arc, resistance and induction furnaces.

Local demand, the ready availability of scrap metals and the low investment required for machinery and equipment in brass foundries all combine to attract men and firms of limited financial means into brass castings manufacture. The demand for nonferrous castings has been growing steadily. Plumbing goods, hardware, art castings, automotive, bearing, valve and fitting and miscellaneous demand based upon considerations of corrosion resistance continue to grow and expand the services for which the products of nonferrous foundries alone can supply the need.

JONES & LAUGHLIN SALES MANAGERS 25 YEARS AGO

Group picture taken on the steps of the old Jones & Laughlin warehouse and general offices at Fourth avenue, Pittsburgh. Left to right, first row: H. F. Holloway, former New York district sales manager; F. H. Holt, former Detroit district sales manager; W. M. Kelley, Atlanta: George Kinsey, former Cincinnati sales manager; Frank M. Campbell, former Philadelphia sales manager; William Armstrong, assistant St. Louis manager. Left to right, second row: D. N. Barker, former Chicago sales manager; A. B. Marble, Boston sales manager; William Bonnell of Otis, Bonnell & Co., former Cleveland representatives; William Best Jr., former San Francisco sales manager; Geo. C. Beals, Buffalo. Of this group, Mr. Marble is the only one active in the Jones & Laughlin organization today. Messrs. Campbell, Barker and Bonnell are deceased

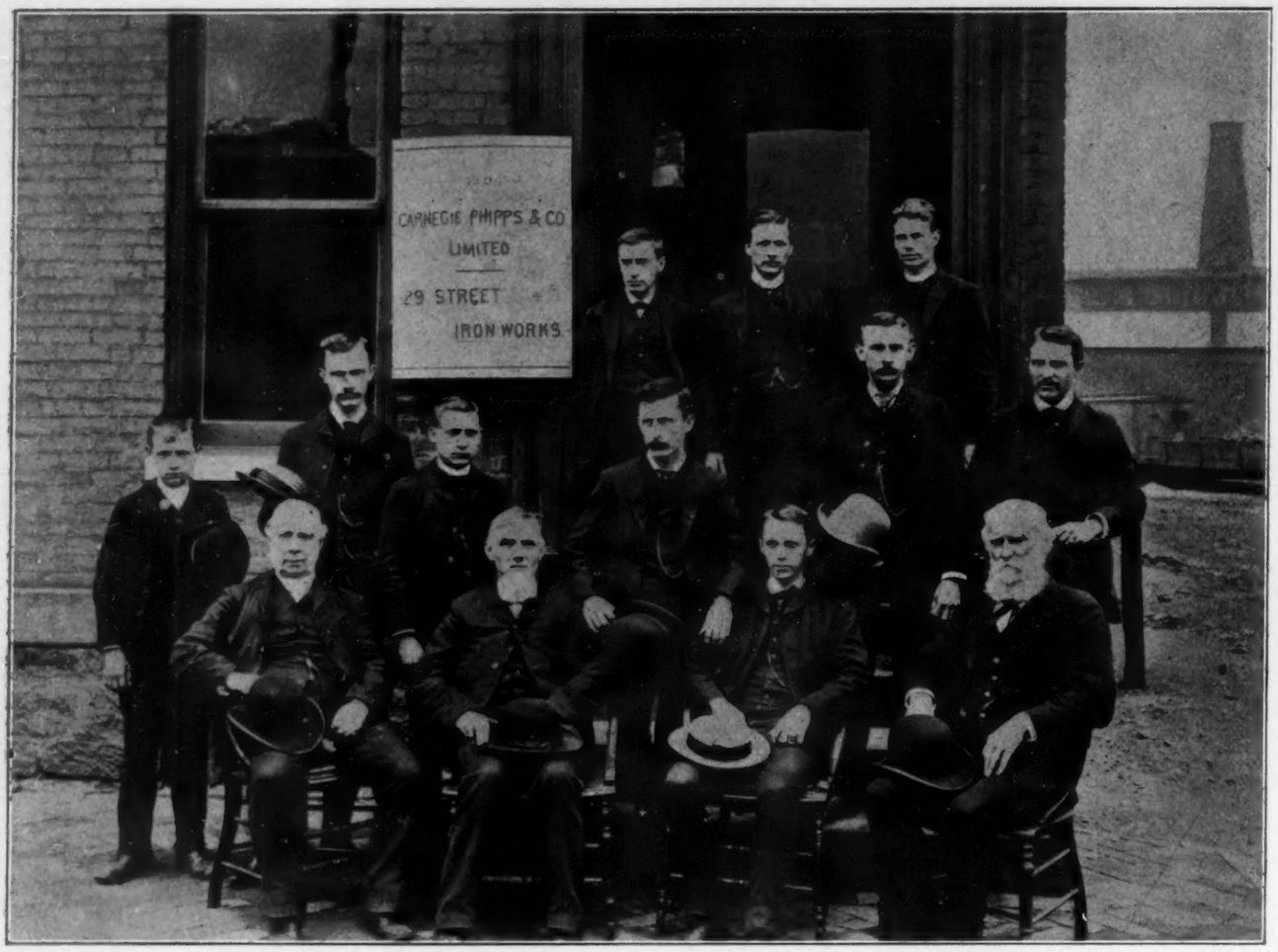
Marketing Methods Show Great Contrast in 25 Years

By E. C. Kreutzberg

AMONG the shades of the first quarter of the twentieth century in the steel industry are many old merchant firms, mighty in their day and way; now but a memory. They were important factors in the distribution of steel in earlier years. A quarter century ago they still were in the hey-day of their prosperity, but even then events were shaping which were to spell their death knell. Although practically all of the famous old organizations of that time long since have passed out of existence, they effectively filled a gap that existed between consumers and producers of steel.

Steelworks were scattered geographically, located with a view to proximity of natural resources. Although the first period of consolidation was nearing a close, the steel industry as yet was composed mainly of small companies which could not afford to maintain countrywide sales organizations. Due to limited monetary resources and the fact that financial stability was uncertain, steel producers generally could not assume many risks without danger of liquidation. The merchant houses, therefore, in drumming up business for the mills and in assuming the burden of collection and payment, rendered an essential service.

Distribution of steel in those days was a phase distinct and separate from production. In few cases were the two operations consolidated to the fullest extent and unified under direction of a company's executives. Sales managers then were more or less per-



TYPICAL GROUP, IN THE LAST QUARTER OF THE NINETEENTH CENTURY

Office force of Carnegie, Phipps & Co., Ltd. in 1866. Top row, left to right, John Walker, Cameron C. Smith, A. B. Reese. Second row, left to right, Thomas Higgins, Frank C. Lane, William B. Dickson, Charles Forester, William Noble, Charles A. Clowes. Bottom row, seated left to right, James Simpson, John Mathews, W. W. Blackburn, and Mr. Shallenberger

functory in office, the power of the industry being in the hands of the operating or production men.

Those old merchant firms, in addition to their regular buying and selling for their jobbing business, arranged many interesting business transactions. For instance, they might sell pig iron to a steel company and take in trade an equivalent tonnage of billets, paying the mill a conversion charge. They might sell sheet bars to a mill and take a tonnage of sheets. Three and four cornered deals were not unusual, the merchant usually gaining benefit on each corner. These transactions were common in the days before large corporations, such as the railroads, had reformed their purchasing methods.

It was not unusual for the large railroads to place their rail orders with merchant firms, leaving the latter to order the rails from the mills. Those were the days when many purchasing agents, despite moderate salaries, were able to reach a state of affluence by reason of additional commissions and other benefits which were characteristic of the period.

Despite the value of services rendered by the merchant firms to industry, producers were keenly aware that reliance upon them had some disadvantages. It was a limiting power which might prove irksome, especially where a merchant firm had contracted for the entire output of the steelworks. Steelmakers felt also that the commissions and other compensations earned by the merchants should rightly belong to the manufacturers. Use of such intermediaries prevented the most effective contact between the mills and consumers and the consequent building up of goodwill on the basis of service.

With the advent of the large corporations and financing of industry on a large scale, mills were enabled to establish their own sales organizations and the opportunities of the intermediaries became more circumscribed. With many merchants the period of decline extended a considerable time. With others it was more rapid. For example, when the United States Steel Corp. was organized in 1901, one leading merchant promptly closed all its branch offices.

Organization by large steel companies of their own sales departments has led to closer relations between producers and consumers. Careful study of consumers' requirements has resulted in better service to the buyers and has enabled mills to build up goodwill in a way not possible in the former years. Direct selling by the mills and the study of individual requirements has been backed up by scientific research. As a result, by the co-ordination of sales, manufacturing and scientific departments, the mills now supply steel which meets much more exacting tests than customary in the old days when tonnage and price were more important than quality and service.

Another objective which the steel companies have accomplished by eliminating the middleman is the minimizing of price cutting on business which does not deserve special concessions. The former merchants would group requirements of consumers and jobbers and thus make up a total tonnage

TYPICAL SALES GROUP IN THE PRESENT ERA OF THE STEEL INDUSTRY; FROM A PHOTOGRAPH TAKEN IN 1914

Top row, left to right, John E. Woods, Wilber Sargent Locke, John W. Dix, W. G. Clyde, W. P. Siebert, Stillman W. Wheelock, Fred C. Deming. Second row, left to right, James R. Mills, George Baker, Frank A. Burr, James B. Bonner. Bottom row, left to right, Charles C. Cluff, W. B. Weston, Donald R. Cotton, N. D. Carpenter, Edwin S. Mills, Albert M. Harper, Edward M. Sparhawk

which was exceedingly attractive and which the mills were glad to take at concessions. By direct selling of today, the individual consumer or jobber finds it necessary to conduct his own price negotiations. The result is that prices are more stable than in the old days. A large steel company executive regards this point as important, saying:

"Intelligent selling unquestionably has a greater influence toward making a successful corporation than successful manufacturing. Millions of dollars can be spent in improving manufacturing facilities and then, through poor selling methods all these advantages can be given away."

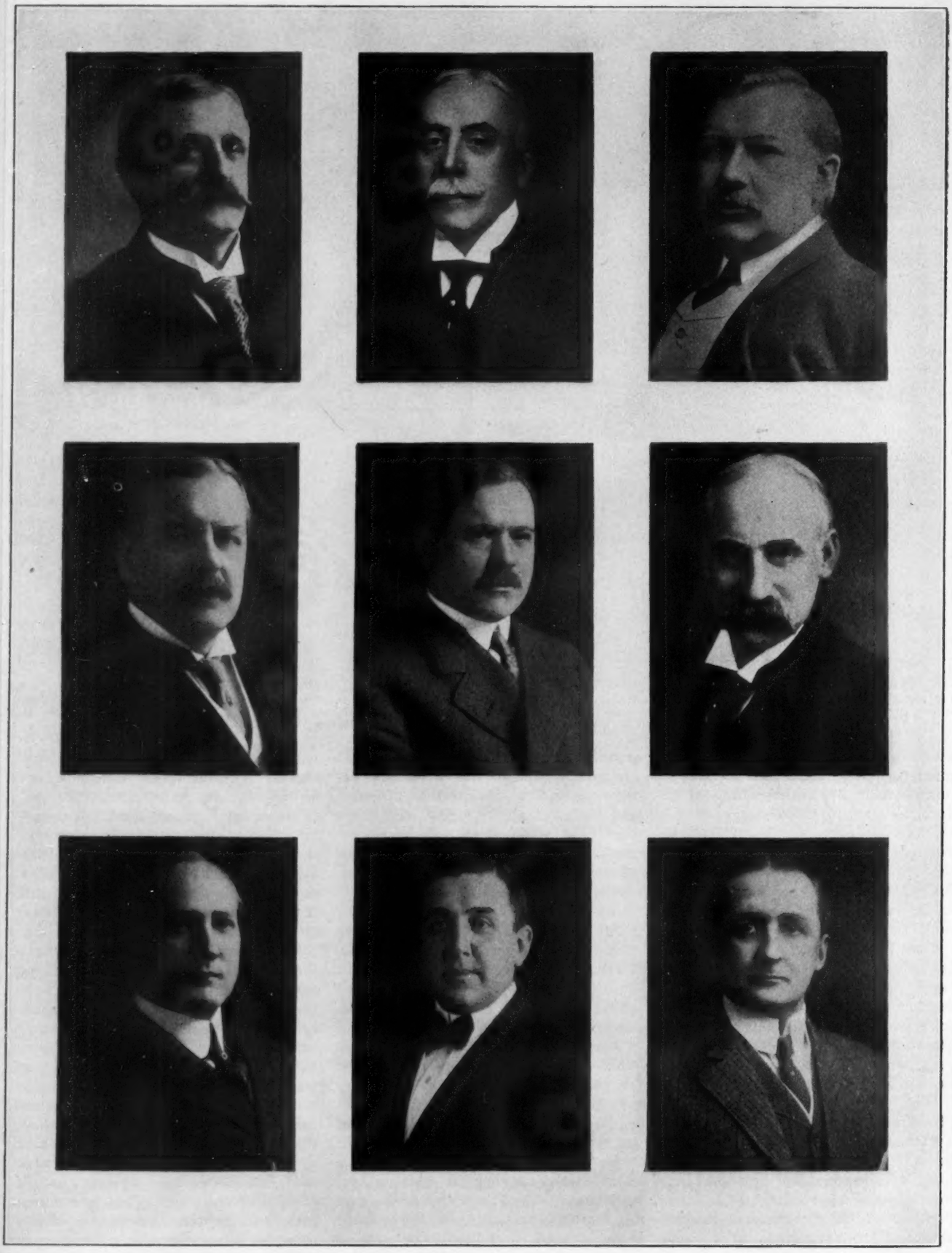
With the problem of distribution placed on a quality and service basis, a higher order of salesmanship is required. In the old days the employment of entertainment and gratuities were factors in obtaining business. Political affiliations, personal relationship and such attributes were important considerations in placing business. Although these circumstances have not been removed entirely, less emphasis is placed on them. The steel salesman succeeds best who is possessed of a thorough knowledge of his product and of the consumers' requirements. A combination of sales and technical ability today makes the best type of salesman. Consequently more emphasis is being placed on salesman training by the steel companies.

Sales Ability Is an Asset

A leader in the steel industry states: "Salesmen are born, not made. I certainly believe firmly in the truth of this old saying. To be a good salesman a man has to have a fine understanding of human nature and the ability to handle his fellowmen. That enables him to make a good first impression and to sustain it. There are plenty of men who through experience overcome an original lack of human understanding and some of these men make good salesmen. The best salesmen a quarter century ago, now and always, are those who are born with sales ability and who have natural social qualities that enable them to handle men of different types and conditions. Those are the men who are sought by sales managers and if they are backed up with good scientific men who study the requirements of customers, a sales combination is possible which would be unbeatable."

This executive says that the opportunities for steel salesmen are greater than ever before. Good merchandising is essential to the success of a steel company, he points out, and this fact is much evidenced by emphasis being placed on distribution.

One great reform in connection with the sale of iron and steel during the past 25 years is the virtual elimination of long time credits. With the establishment of the federal reserve banking system in 1913 and the flexibility that it has made possible in our credit system, there is no longer a need for extending the terms of payment beyond a comparatively short time. A quarter century ago sales to agricultural machinery builders were made on terms of payment in six months to one year. This was necessary because the agricultural implement manufacturer sold to the farmer on long time notes, and consequently needed help to carry the financing burden. The steelworks provided the backstop. The present practice is cash in 30 days, subject to 1 per cent dis-



SALES EXECUTIVES OF STEEL CORPORATION SUBSIDIARIES EARLY IN QUARTER CENTURY

Left to right, top row: George Baker, general manager of sales, Illinois Steel Co.; James A. Farrell, president, United States Steel Products Co.; Frank A. Baackes, vice president and general manager of sales, American Steel & Wire Co. Left to right, middle row: Daniel Coolidge, president, Lorain Steel Co.; Samuel H. Benner, manager of sales, Carnegie Steel Co.; Edward Worcester, manager of sales, National Tube Co. Left to right, bottom row: J. I. Andrews, manager of sales, American Tin Plate Co.; E. W. Pargny, manager of sales American Sheet Steel Co.; and F. A. Burr, manager of sales, Tennessee Coal, Iron & Railroad Co.

count for cash in 10 days. In some cases sales are made on the basis of cash in 60 days subject to 2 per cent discount for cash in 10 days.

One large producer of steel products, whose sales aggregate $75,000,000 to $80,000,000 per annum, reports that 90 per cent of his company's business is paid in cash on a monthly basis. That is, gross collections against shipments at the end of the month represent 90 per cent of the company's business. It is believed that this instance is a typical reflection of the state of affairs in the steel industry generally at present as far as the status of collections is concerned.

Notwithstanding the tendency of salaries to increase because of the higher cost of living, the unit cost of selling has decreased. It seems unsafe to particularize on this point, however, as there are so many variations in the cost, depending on the kind of product, the territory and the individual companies.

At the same time the old time commission merchants in steel products were being eliminated there also was a tendency toward the elimination of the merchant pig iron commission houses. This has not been quite so marked as in the case of the steel sellers. Nevertheless many of the prominent pig iron merchants of a quarter century ago now live only in memory. The reason for this change has been the same as underlies the elimination of the old merchant steel firms. As in steel, pig iron has come to be handled in larger groups. A good deal of the merchant pig iron sold today is marketed direct by the producers through their own district sales offices and salesmen.

Competition Between Materials

Gradual change in the economic and industrial life of the United States during the first 25 years of this century has altered considerably the problems being faced by the steel industry. Instead of competition of American open-hearth steel with foreign bessemer products, or in place of iron and steel rails fighting for supremacy, the metalworking industry now is competing for progress with other materials. Wood, stone, fiber, composition and concrete are but a few of the materials with which steel now must compete. Moreover, the steel industry is faced with the problem of retrieving its rightful hold on certain markets, lost through neglect when competitors were active.

In the earlier years of the century, when the steel industry still had insufficient capacity to meet the rapidly increasing demands, less attention was paid to sales problems. Greatly expanding industrial operations, a heavy inflow of immigrants, and more intense concentration of population in cities were stimulants to buying which taxed plant capacities. Since 1918, however, the entire situation has been changed. Demands for iron and steel for military purposes during the World war occasioned the addition of considerable productive capacity. On Dec. 31, 1916, 17 blast furnaces were building and a year later 13 were to be built. Steelworks and finishing capacity were added in like proportion.

Excess Capacity Presents Problem

After the war, despite the record-breaking production of automobiles, steelmaking capacity was far from taxed. Producers had built up large organizations for the production of steel, distribution consisting merely of order taking. It was such sales coups as that of Charles M. Schwab when he was made representative of the French government for the purchase of materials in the United States, that more than filled American plants. Later steel for the American army and navy absorbed all available capacity. When such unusually heavy orders were no longer available at the close of the war, steelmakers were faced with the problem of building up new demands.

The industry had grown beyond the small unit stage of the early years of the century. Competition no longer is between individuals but between companies and industries. Such competition breeds a higher degree of salesmanship. The importance of distribution in the life of steel companies is being more and more realized by industrial leaders. Problems of production are benefited by the many years of concentration upon the technicalities of steelmaking. Scientific research has developed formulae for production, and the industry now is capable of supplying almost any desired kind of steel in quantities exceeding demand.

Distribution Big Problem Now

The same degree of scientific investigation now is being centered upon the problem of distribution by many companies. In former years, salesmen went into cold territories and worked up prospects, developed customers and spread the reputation of their companies. Today salesmen are trained thoroughly by experts in the products they are to sell. They are preceded into their territory by various forms of advertising and after reaching their customers are supported by sales literature and by complete home office co-operation, often involving use of technical experts for solving particular problems of the customers. Companies are selecting executives trained in distribution. One of the most prominent examples of this occurred Oct. 31, 1925 when William G. Clyde, then general sales manager and vice president, was elected president of the Carnegie Steel Co. This set aside what had become recognized as a precedent with that company, some five preceding presidents, including Charles M. Schwab and Henry C. Frick, all having been primarily operating men.

Distribution during the next 25 years, as indicated by the present trend of developments probably will be one of the most important problems facing steelmakers.

Development of trade associations, such as the Sheet Steel Trade Extension committee, and their work for the building up of a product and trade consciousness, should enhance greatly the demands for steel. Such activity will be necessary to offset the popular favor being gained by products made of brick, tile, wood, fiber and various compositions.

Sell Less on Price?

Sellers probably will find more and more difficulty selling on price. A buying sense is being developed by consumers. With the scope of current advertising programs, the vast amount of information contained in trade magazines and newspapers, buyers find it much easier to maintain an active touch with the market, following prices and practices. This will necessitate producers selling more on a service basis. It will be no unusual procedure, if present practices are expanded, to find steel producers sending their scientific men into the plants of consumers to investigate the metals most satisfactory for a particular operation or product. The producer then of the grade of steel most satisfactory probably will receive the order, price being a secondary consideration.

After 25 years of tremendous progress, the steel industry is yet in its infancy, when the illimitable ramifications of its possibilities are visualized. No one can say definitely from what direction new large demands for steel will come, but their coming is inevitable. In the meantime the ordinary every day needs of the growing republic present a problem of distribution that has not been solved satisfactorily.

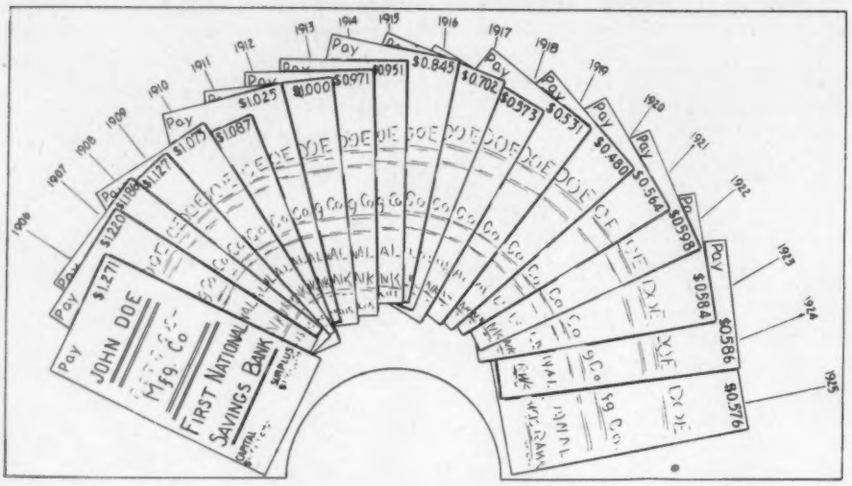


Fig. 1—How much will $1.00 buy? In 1906, every dollar in the pay envelope was worth $1.271 in food supplies. Today, 1913 dollar value has shrunk to $0.576, measured in cost of living. However, wages have increased greatly.

Status of Industrial Relations Improves in 25 Years

By William W. Maloney

INDUSTRY'S steady march to higher ground throughout the first quarter of the present century has been the result of numerous contributing factors, not the least of which are incorporated in the term "industrial relations."

Any analysis of industrial and economic growth in a given period is likely to emphasize unduly the advances made in the application of science, in developing natural resources and in organizing capital. As a rule, adequate attention is not given to the important role played by human engineering, which has to do with the relations between employer and employe.

In spite of a seemingly endless controversy, the past 25 years of the present century have witnessed greater progress in improving conditions of employment than in any similar period, considering the difficulties involved. It must be remembered that such success as has rewarded the efforts of employers and employes to get together has been achieved in the face of constantly changing conditions which daily have become more complex.

The dawn of the twentieth century found the so-called forces of capital and labor lined up for battle. The bitterness of the Homestead and Pullman strikes had not entirely disappeared. Suspicion and hatred ruled both camps.

Now, on the threshhold of another quarter, this open hostility is not apparent. Certain methods for settling disputes, while still crude and unwieldy, are proving effective in most cases. The principal combatants now consider with respect the weight of public opinion—a factor not even recognized in 1900. Employers realize the power of labor—organized and unorganized—and the employes have a far better understanding of the problems of management and therefore the limitations of employers to grant demands.

What has brought about this change?

Perhaps the most important factor is the improved condition of the worker. The average wage earner is better informed than he was 25 years ago. His working conditions are better. Opportunities for healthy and wholesome home life are far superior than they were. The hazards of most occupations have been minimized, and relief from the results of accidents is more satisfactory and certain.

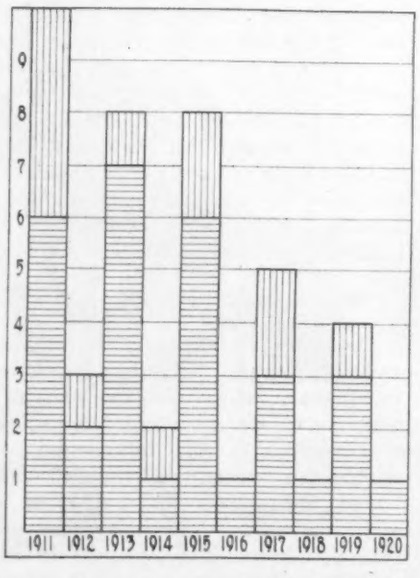


Fig. 2—Passage of workmen's compensation laws by 42 states. Vertical shading indicates compulsory provision; horizontal, elective

The most tangible measure of the employe's condition is the purchasing power of his pay envelope. Fig. 3 shows the trend of four essential earning factors: Union rates of wages per hour, cost of living, and relative purchasing power of wages and of the 1913 dollar measured in living costs. Three distinct periodic tendencies are shown, each illustrating a minor industrial trend.

Period I shows the workers holding a slight advantage in the shape of a gradual wage increase, an advantage cut down by a more rapidly rising living cost. The wage earner's theoretical dollar fell from a value of $1.271 in 1906 to $1.025 in 1912. All factors meet at the chosen normal of 1913.

Lean years followed, with wage and dollar power skidding downhill. When prices began to descend after 1918, wages were just "catching up." Meanwhile, dollar value still had not touched the bottom, so that wage purchasing power began to rise after 1918. The curve slants up sharply as wages and prices draw together.

Wage and price curves crossed dur-

ing 1920, augmenting and augmented by a more healthy American dollar value. Then prices continued downward and pulled down wages as well, although temporarily. Since 1921 there has been only a slight change in the indices of retail prices and of dollar value measured in cost of living. Yet the trend of union wage rates has continued upward, and with it the purchasing power of the pay envelope.

General conclusions may be drawn from statistics which show the trend of steel prices and of common labor rates of the Steel corporation. Total wage earnings since 1920 have not been depressed but have closely paralleled increasing price levels. In the iron and steel industry the growing spread between prices and wages shows that the steelworker has had no cause for complaining that he has not received his just share.

The quarter-century has witnessed an odd collection of attempts to improve the lot of the wage earner. Elaborate departments have been set up to care for the workers' interests, but many of them have failed. The plans that have survived the test of time are those which appeal to the employe's sense of justice, but which do not presume to encroach on his prerogatives.

Shop Unions Have Developed

One of the most successful institutions emerging from this array of experiments is employe representation. It exists in the form of company or shop unions, in workers' committees and in parliamentary bodies with representatives of the company and of the workers constituting the "senate" and "house." Many of these plans have been operating successfully over a period sufficiently long to prove their merit.

Perhaps no phase of industrial relations has been given more attention than welfare work, which has embraced employes' clubs, hospitals, building and loan associations, athletic associations, dramatics, publication of employe magazines, community nursing, public playgrounds, schools and numerous other activities. When properly administered, work of this kind has yielded desirable results. Many employers have learned that these activities thrive best when the workers feel their share of responsibility in maintaining them. Plans built on a paternalistic basis have proved unsatisfactory.

One of the outstanding accomplishments of the period has been the progress in accident prevention. Credit for this is due the National Safety

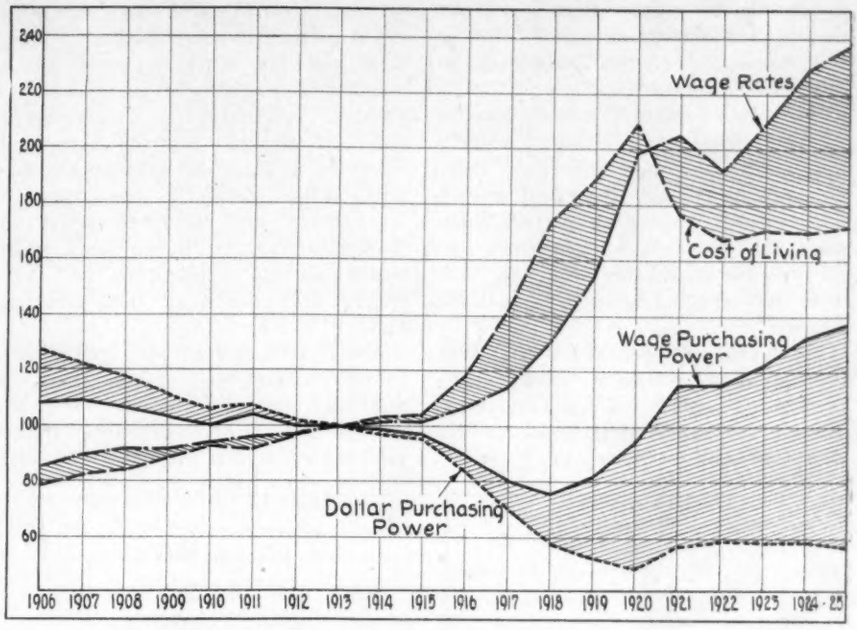


FIG. 3—FOUR FACTORS WHICH HELP DETERMINE THE WORKER'S WELL-BEING: 1. UNION WAGE RATES PER HOUR; 2. COST OF LIVING; 3. WAGE PURCHASING POWER MEASURED IN COST OF LIVING; AND 4. VALUE OF 1913 "COST OF LIVING" DOLLAR

council, organized in 1910, and the numerous companies and trade and technical organizations which have adopted safety programs. Creation of "safety first" as an industrial slogan and the development of a national consciousness for safety have led to an amazing reduction in accidents and in occupational diseases. The history of accident prevention is one of the brightest chapters in the annals of American industrial progress. Fig. 5, showing the trend of accident frequency rates, indicates how remarkably successful the safety movement has been in the steel industry. More complete figures follow:

	Per cent 1911	Per cent 1924
All departments	69.2	33.6
Blast furnaces	76.1	30.7
Bessemer	101.5	24.9
Open hearth	84.2	32.9
Foundries	60.1	62.7
Heavy rolling mills	61.0	21.2
Plate mills	69.4	29.4
Sheet mills	44.1	35.1

Pension plans have been given much attention during the past 25 years, and it is in this phase of welfare work that many manufacturers overstepped the limits of good sense. Numerous cases could be cited where

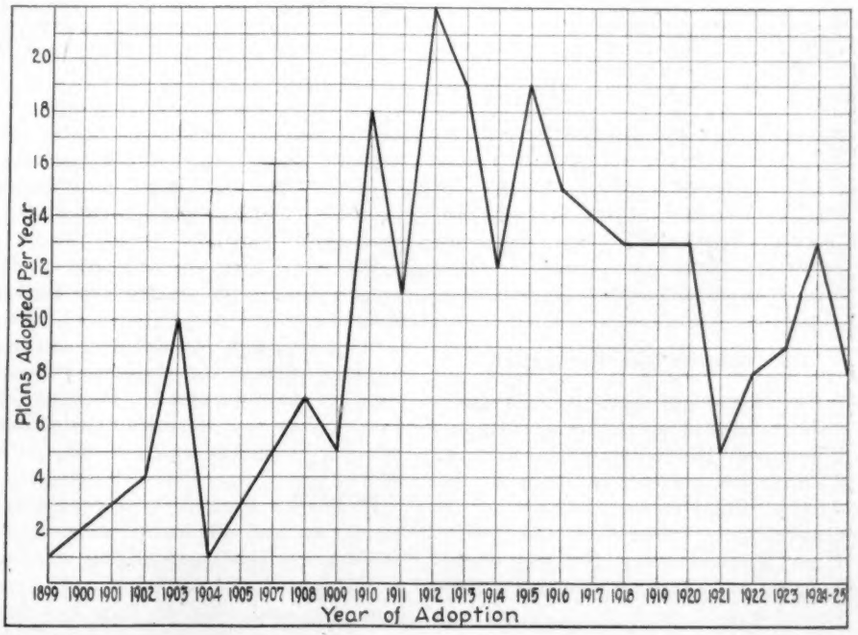


FIG. 4—ADOPTION OF OLD AGE AND DISABILITY PENSION PLANS BY 257 COMPANIES COVERING A WIDE RANGE OF INDUSTRIALS

pension plans were adopted without due regard for the ultimate cost or for the extent of the benefits to be derived.

For this reason many pension set-ups came to grief. Fig. 4 clearly shows the rise and decline of their popularity. Plans conceived on a business-like basis have proved beneficial, but a survey of companies employing them probably would show a wide difference of opinion as to their success.

Workmens' compensation laws now are on the statutes of most of the industrial states of the country. Washington and Kansas were the first with their acts of March 14, 1911. Today 42 states and the District of Columbia possess similar laws, the rate of their passage being indicated in Fig. 2. The legislatures of Arkansas, Florida, Mississippi, North Carolina, South Carolina and Missouri alone fail to provide workmen's compensation.

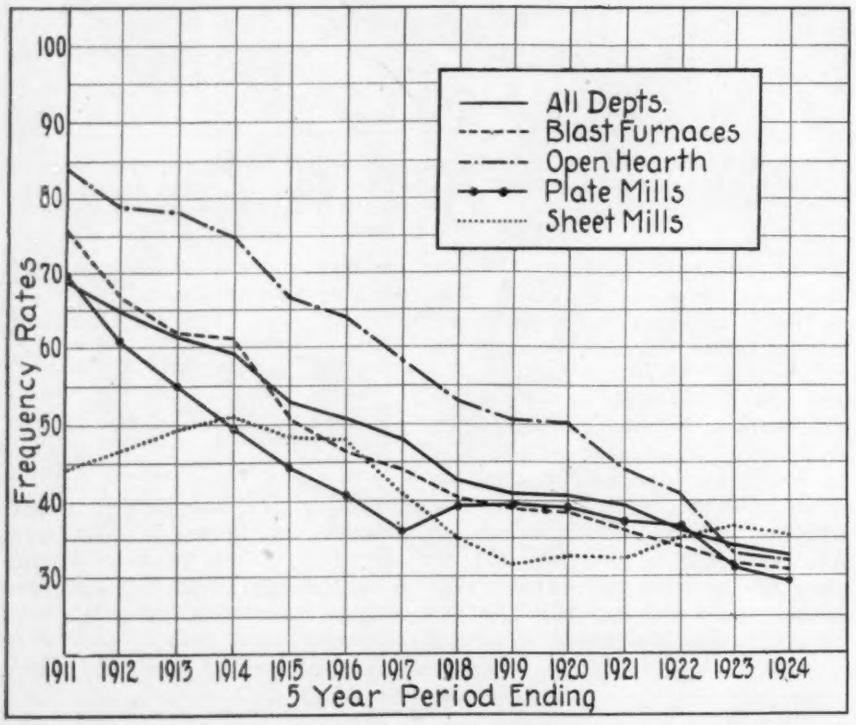


FIG. 5—THE TREND OF ACCIDENT FREQUENCY RATES BY 5-YEAR PERIODS FOR SPECIFIC DEPARTMENTS OF THE IRON AND STEEL INDUSTRY SHOWS TANGIBLE RESULTS OF "SAFETY FIRST" MOVEMENT

Arbitration Now Recognized

Development of machinery for amicable settlement of industrial disputes is one of the outstanding features of the last quarter century of industry. Chief among the accepted instruments is arbitration, the United Mine Workers being the one organization refusing to arbitrate their problems with employers. In the iron and steel industry itself, which is not highly unionized, the bi-monthly bar and sheet wage settlements obtained through conjunction of employers with the Amalgamated Association of Iron, Steel and Tin Workers, constitute a conspicuous example of the use of arbitration proceedings. Commercially also, industry is coming more and more to settling by arbitration disputes which formerly went through law courts and produced great ill feeling between the participants. The recent federal arbitration law evidences the growth of this point of view.

Many other factors have contributed to better relations between employer and employe. The courts have restricted the use of unwarranted power on both sides. The diffusion of wealth has helped the workers better to appreciate the attitude of big business. Employers are more prone to consider amicable relations with labor a business asset.

But while progress has been made, a hard road must be traveled before ideal conditions can be realized. Machinery is sorely needed for settling disputes without the strife and inconvenience now incurred. Perhaps no single phase of American industrial activity is more wasteful than the strike.

If in the present quarter century employers and employes can contrive to eliminate this demoralizing weapon, a service of untold value will have been rendered. To do this, industry must substitute other more acceptable methods of settling industrial disputes.

Steel Age Inaugurated in Quarter Century

(*Concluded from Page* 768)

developed the present Pacific Coast Steel Co., with Judge E. M. Wilson as chief executive, and with works at various points from Seattle, Wash., to Los Angeles. The Utah Steel Co. has well under operation an ambitious blast furnace development at Provo, Utah, supplementing the efforts of the Colorado Fuel & Iron Co. to help the West help itself.

An interesting chapter might be written around the extraordinary growth of the American export industry in iron and steel products, from great tonnages of American wrought pipe, sheets and tin plate to Japan, Canada and in fact all around the globe, to typewriters, sewing machines, machine tools, etc. The pace for this was set in the heavier steel products by the United States Steel Products Co. under the presidency of James A. Farrell, now president of the Steel corporation.

Inland Waterways Are Factors

But with all the vast new developments along the Great Lakes, the Atlantic and Pacific coasts and in the new South, there be those who see a vast future in store for the industry in the Mississippi valley. Through the impending inauguration of a 9-foot stage of navigable water practically all the year around in the Ohio river they believe will come cheap and widespread transportation of excellent coal from adjacent hills, which now is leading to great electric power plants being established on the river banks. Coincident to this cheap fuel and electric power development is coming along the expansion of iron and steel works along the Ohio river below Pittsburgh, such as at Weirton, W. Va., Wheeling, Steubenville, Ironton, O., Ashland, Ky., Portsmouth, O., and elsewhere. Vast barge loads of steel products are moving in increasing numbers down the Ohio and Mississippi rivers bound for the Southwest and farther West and ultimately for the Gulf for export. This movement, it is held, must increase inevitably as the improvement of the interior rivers follow such development as Muscle Shoals and other vast inland power plants, spreading up and down the Mississippi and Missouri rivers to the important cities along their banks. In fact, this industrial development in the interior now is well under way and as one vast "workshop of the world" does not appear so far in the future as it once seemed at the opening of the first quarter of this century.

Wealth Widely Diffused in Machine Era

(*Concluded from Page* 763)

undisputed control of the business in the hands of the "inside" interests holding in many cases about 15 per cent of the company's total stock. In practice it takes about 30 per cent of a company's stock to get control when voting securities are widely distributed. The plan to issue nonvoting common stock probably was devised to retain the advantages which the readier sale of common stock enjoys while at the same time restricting control.

Opponents of this plan, the most famous of whom is Prof. W. Z. Ripley of Harvard university, maintain that it "disfranchises" the common stockholder and ties his hands in the matter of exercising any voice in the affairs of the company. On the other hand it is held by friends of the plan that stockholders are notoriously neglectful of the rights they possess, and that since control of a company with voting common stock may be purchased in the open market, its management may at any time be wrested from competent hands and placed into incompetent ones.

Moreover, with control centered in a small group responsibility can be definitely placed. This, it is maintained, is an important advantage for the common stockholders, whose chief interest is in a strong management and uninterrupted dividends. Whatever the merits of the case, the fact remains that the practise of issuing nonvoting shares is growing. Up to last year the number of companies which had issued them was comparatively small, but in 1925 no less than one-third of all stock issues were of the nonvoting variety. The problem has been brought into the limelight of public scrutiny and at present the weight of opinion seems to be adverse to the practice.

Together with deep-lying changes in business organization and financing the past quarter century has brought developments calculated to work toward greater stability of business. One of the most important steps in this direction has been the development of business statistics. Comparatively a new science so far as comprehensive study and gathering of data go, great strides have been made in business statistics in recent years. With a broader dissemination and knowledge of current and historic facts of trade and a keener insight into the meaning of the data the inevitable result will be to smooth out the curve of business fluctuations. The effect is already discernible. Business facts are now gathered and broadcast by trade associations, the government, leading business papers and other agencies.

Another contribution of incalculable importance to the stability of business was the federal reserve system inaugurated in 1914. The federal reserve system has banished the bogey of financial panic and removed for all time the dark lurking fears of sudden banking calamity.

It seems more than likely that the next 25 years will see developments in business and in the conquests of science which will pale all that has gone before. Moreover a titanic struggle for the markets of the world stretches ahead. America enters the struggle as a creditor nation, instead of as a debtor one as she was at the start of the century. New problems therefore confront industry, but none of them is insurmountable. The one great fact is that as the curve of world prosperity rises, consuming markets will grow and international commerce will expand. In all this American industry gives every promise of winning an ample share.

Outstanding Personalities in Steel Industry

(*Concluded from Page* 773)

Republic Iron & Steel Co., and P. D. and L. E. Block, of the Inland Steel Co.

It may not be strictly accurate for us to say that a new type of executive is developing in the steel industry, with the growing need for more experienced salesmanship; but rather, that more executives of this type are being developed. Production capacity has been developed to a point where it is no longer the principal problem. It is true the need for improvement in plant and equipment will persist in the endless effort to reduce costs, but the greatest task in the industry today is to meet the stronger form of competition. There is competition between producers within the industry, and competition against the entire industry from other industries producing other materials they want substituted for steel. It is believed this two-fold competition will call for more proficiency in selling and distribution, with consequently greater recognition of sales executives.

A few recent changes appear to indicate the new trend of events. W. G. Clyde, sales manager of the Carnegie Steel Co., was selected as its president; a typical instance of a sales expert advanced to high executive position. Frank Purnell, vice president in charge of sales, Youngstown Sheet & Tube Co., became assistant president, and is the chief executive of that company in the absence of its president. E. W. Pargny, who was sales manager of the American Sheet & Tin Plate Co., now is its president. That more importance is being attached to the office of sales manager is evident in many other directions.

It has been 25 years for the magnificent industrial machine, called the steel industry, to be geared up to its present high state of productive efficiency; it now remains for a newer generation of supersalesmen to make the most of it.

Pig Iron Economics Undergo Changes

(*Concluded from Page* 775)

larger tonnages. It has had an effect on the pig iron industry in that it greatly enlarged the use of scrap instead of virgin iron and to that extent has affected demand for iron and lessened the potential market for the blast furnace product.

Another marked change in a related industry is seen in the shift from beehive to by-product coke. This is a matter of economy, in that the by-products wasted in the former process are reclaimed and made profitable in the latter. This change has been almost entirely since 1900. In that year there were only 1000 by-product ovens in the United States, producing slightly over 1,000,000 tons of coke. In 1925 there were more than 12,000 ovens of this type, with production well above 33,000,000 tons. Meanwhile beehive coke had declined from 19,000,000 tons per year to 9,000,000 tons. In 1918 by-product coke caught up with beehive in tonnage and since then has been increasing its actual tonnage while its former competitor has been decreasing.

The proportion merchant pig iron bears to nonmerchant has declined from somewhat above 40 per cent of the total production in 1900 to a little more than 25 per cent in 1925.

While the average furnace in 1925 produced far more iron than the average in 1900, the record of furnace K at the Edgar Thomson works of the Carnegie Steel Co., March 30, 1905, in producing 918 tons of pig iron in 24 hours, set a record that has not been exceeded by more than a narrow margin to this day. This is an indication that mere production of iron has not changed greatly and that refinements, economies and changes in surrounding circumstances have been more marked than in the industry itself.

Chronological Record of Quarter Century Marks Progress

1900

United States open-hearth steel production exceeds Great Britain's for first time.

D. P. Anthony conceived idea of wire fence in 1898. Production started in 1900.

World's pig iron production estimated by Swank at 40,400,000 tons.

Prof. H. LeChatelier devised inverted microscope for examining opaque substances.

Taylor and White first displayed rapid cutting tool steel at Paris exhibition. Patent dated 1901.

Kjellin electric furnace patented.

Chicago draining canal opened Jan. 2.

Paris exhibition opened April 15.

Heroult, a Frenchman, invented electric steel.

Diesel, a German, invented the diesel oil engine.

1901

Feb. 25, certificate of incorporation for United States Steel Corp. filed at Trenton, N. J. Capitalization $1,100,000,000. E. H. Gary, chairman, Charles M. Schwab, president.

Steel corporation, April 1 acquired control of American Steel & Wire Co., Carnegie Co., Federal Steel Co., American Tin Plate Co., National Tube Co., American Sheet Steel Co., National Steel Co. and American Steel Hoop Co.

Pittsburgh Steel Co., Cambria Steel Co., organized and incorporated.

Germany passed England in pig iron output.

Charles M. Schwab purchased control of Bethlehem Steel Co.

Northern Pacific stock corner and consequent panic May 9.

Pan American exposition May 1 to Nov. 2.

President McKinley assassinated, Sept. 16.

Guglielmo Marconi signalled letter "S" from Newfoundland to England, Dec. 12. First wireless message sent in 1902.

1902

Steel corporation purchased Union Steel Co., Sharon Tin Plate Co. and Sharon Sheet Steel Co.

Oxygen melting process invented by Dr. E. Menne, Creuzthal, Germany.

First universal beam mill operated commercially successful at Differdingen, Germany, following development and patent by Henry Gray at Ironton Structural Steel Co., Duluth, in 1898.

Gas engines first operated in United States on blast furnace gas.

Pennsylvania coal miners numbering 145,000 struck May 12, settled Oct. 23 by President Roosevelt's commission.

First international arbitration court opened in October at Hague.

1903

United States cable to Philippines completed July 4. Message sent around the world in 12 minutes.

United States Steel Corp. acquired ore interests on Mesabe range of J. J. Hill and Great Northern railroad by lease.

Successful mechanical airplane flight made by Wilbur and Orville Wright, Dayton, O., Dec. 17.

First period of consolidation and combination terminated.

Carnegie Steel Co. formed of Carnegie Co., American Steel Hoop Co. and National Steel Co.

H. C. Frick Coke Co., American Coke Co. and Continental Coke Co. consolidated under name of H. C. Frick Coke Co.

American Sheet Steel Co. purchased American Tin Plate Co. to form American Sheet & Tin Plate Co.

Department of commerce was organized.

1904

Panama canal construction under United States supervision started.

Duplex process of steelmaking introduced into America by Tennessee Coal, Iron & Railroad Co.

Sintering of magnetic concentrates introduced in Sweden.

Bethlehem Steel Corp. incorporated with $15,000,000 common and $15,000,000 preferred stock.

Russo-Japanese war started Feb. 6.

St. Louis exposition opened May 1.

New York subways officially opened Oct. 27.

1905

Interstate Iron & Steel Co., Chicago, organized and incorporated.

John W. Gates syndicate acquired control of Tennessee Coal, Iron & Railroad Co. Consolidation with southern interests of Republic Iron & Steel Co. followed.

On March 30, "K" furnace of Edgar Thomson works, Carnegie Steel Co. made a record production of 918 tons, largest 24-hour total to date.

Norway dissolved union with Sweden.

1906

Indiana Steel Co. organized as Steel corporation subsidiary.

First Heroult furnaces installed in United States.

Sixty-two blast furnaces authorized for construction in United States for 1906.

Ten Talbot furnaces installed in America.

San Francisco earthquake and fire caused $400,000,000 property damage, April 18-19.

1907

New production records established with iron ore at 52,955,070 tons and pig iron at 25,781,361 tons.

Tennessee Coal, Iron & Railroad Co. was sold to the Steel corporation.

Titanium first was applied as physic for molten steel in rail manufacture.

Steel corporation purchased 1580 acres for steel plant near Duluth.

Waukegan and Worcester plants of American Steel & Wire Co. perfected in January automatic machinery for coiling, cutting and looping springs.

Vanadium steel first produced in open-hearth furnaces on commercial scale by United Steel Co., later United Alloy Steel Corp., product going to Ford Motor Co.

Wall street experienced panic on March 14.

Jamestown exposition opened April 26.

1908

Production in new furnaces of Gary plant of Indiana Steel Co. started.

Oxygen melting process introduced into United States for opening frozen tap holes.

1909

Payne-Aldrich tariff reduced duties from 1897 level; pig iron from $4 to $2.50; scrap iron and steel $4 to $1; steel ingots lowest class, $6.72 to $3.92; steel rails, $7.84 to $3.92 all per ton; tin plate, 1.50c to 1.20c per pound; coal 67c to 45c per ton, and iron ore 40c to 15c per ton.

Rogers-Brown Iron Co. organized.

Open-hearth steel tonnage exceeded bessemer for first time, due largely to enlarged capacity at Gary and Ensley, Ala.

Dominion Steel Co. and Dominion Coal Co. consolidated into Canadian Steel Corp., taking in Hamilton Steel & Iron Co., Canada Screw Co., Hamilton Nut & Bolt Co. and Toronto & Montreal Rolling Mills Co.

Iron ore shipments began from Cuyuna range in Minnesota.

Hudson-Fulton celebration held in New York, September to November.

1910

Louis M. Atha, developed all scrap open-hearth process at Titan Steel Casting Co., Newark, N. J.

N. S. Maccallum, Phoenix Iron Co., patented bifurcated castings spout.

Louvier and Luis developed process for manufacturing ferrosilicon in electric furnaces from furnace slags.

American Iron and Steel institute was formed.

Chinese ore first was brought to Pacific Coast.

1911

William E. Corey resigned in January as president of Steel corporation, having succeeded Charles M. Schwab in 1901. James A. Farrell followed Mr. Corey.

Turbo-blowers installed at three American blast furnaces.

Iron ore concentrator installed at Oliver Iron Mining Co. on

Economic and Industrial Advances Are Greatest in History

Mesabe range, produced 1,900,000 tons in 160 days.
United States supreme court ordered Standard Oil Co. combine dissolved May 15. Ordered American Tobacco Co. combine dissolved May 29.
Postal banks established in New York, Chicago, St. Louis and Boston, Aug. 1.
Glen H. Curtiss invented the hydroairplane.
Dissolution suit against Steel corporation charging monopoly instituted Oct. 26 by Attorney General Wickersham.

1912

Large iron ore deposit opened in eastern Texas.
Copper successfully introduced as steel alloy addition.
Balkan war precipitated.
Steamship TITANIC wrecked off Canadian coast, 1517 lost, April 14-15, many American industrial leaders being drowned.
Isaac N. Lewis invented the machine gun.

1913

Sixty-third congress passed Underwood tariff, law effective Oct. 3. Iron ore, pig iron, slabs, blooms, other forms of iron and steel made free. Ad valorem duties on bar iron, 5 per cent, structural shapes 10 per cent, tin plate, 15 per cent, tubes 20 per cent. Twenty per cent imposed on other manufactures of iron and steel not specifically listed.
Duplex process of steelmaking adopted by Lackawanna Steel Co.
Peace palace at Hague dedicated.
Clayton Act passed, putting teeth in Sherman antitrust law.
Income and inheritance taxes imposed. Excess profits tax adopted and repealed.
Department of labor was created March 4.

1914

European war precipitated, Aug. 1.
Year of light demand for steel.
Federal reserve banking system established.
Chile began shipping iron ore to Bethlehem Steel Co. in America.
Panama canal was opened Aug. 15.
Federal trade commission act created five man commission.

1915

Broken Hill Proprietory Co., New Castle, New South Wales, Australia, new steel works built.
Federal district court of appeals found in favor of Steel corporation in suit for dissolution filed by government.
Panama Pacific exposition opened in San Francisco, Feb. 20.
Wireless communication between Japan and United States established July 27.

1916

Rail sales totaled 4,000,000 tons, Russia placing one order for 400,000 tons.
Shipping board created by Alexander bill to build 63 warships and buy or build $50,000,000 of merchant ships
Caterpillar tractor converted into trucks.

1917

War declared by United States, April 6.
Government set regulations on prices and distribution.
Iron ore production totaled 75,424,000 tons and pig iron 42,400,000 tons.
Illinois Steel Co. started largest electric steel plant in world in November.
Government operation of railroads started, Dec. 28, under William G. McAdoo.
Czar Nicholas of Russia abdicates and Lenin and bolshevists seize power.
American steel ingot production sets record at 43,619,200 tons.
Emergency Fleet Corp. formed April 16.

1918

By-product coke output exceeds that of beehive for first time.
Fuel conservation started Jan. 17 by Fuel Administrator Garfield.
First keel laid in Hog Island Shipyards, Feb. 12.
Ford Motor Co. began "eagle" submarine chaser manufacture at Detroit.
Daylight saving bill effected industrial economies.
Armistice of major warring powers signed Nov. 11.
Webb-Pomerene act permitting consolidation for exporting passed.

1919

Restrictions on tin imports lifted, ending wartime control.
Steelworkers attempted nationwide strike, Sept. 22. Pittsburgh district not seriously affected. Late October saw all mills again operating almost normally.
Nov. 1 bituminous coal operators struck.
Department of commerce industrial board organized in February, disbanded in May.
Emergency Fleet Corp. delivered 748 steel vessels of 4,893,000 deadweight tons.
Tar and coke oven gas combined for open-hearth process.
Andrew Carnegie died at Lenox, Mass., Aug. 11, aged 83.
Henry C. Frick died Dec. 2 aged 70.
Airplane service between New York and Chicago started.

1920

Prohibition amendment proclaimed in effect, Jan. 16.
Supreme court handed down decision that Steel corporation not a trust under Sherman antitrust law, March 1.

1921

Limitation of armament conference at Washington, Nov. 11 to Feb. 6, 1922.
C. Eickenmeyer invented compound gas engine.
President Harding signed congressional peace treaty with Germany and Austria July 2, ratified in Germany, Aug. 25, and by United States senate Oct. 18.
Emergency tariff act passed.

1922

Fourteen Russian republics form Union of Soviet Socialistic Republics.
Fordney-McCumber tariff act signed by President Harding, Sept. 21, making rates flexible subject to presidential proclamation. Pig iron from free to 75 cents per ton, steel wire, 20 per cent or more ad valorem and steel rails 1/10 cent per pound.

1923

President Harding died Aug. 2.
Japanese earthquake Sept. 1 killing 100,000.
Youngstown Sheet & Tube Co. and Steel & Tube Co. of America merged.
Eight-hour day generally established in the steel industry.

1924

Dawes reparation plan accepted by Allies and Germany, Aug. 16, Owen D. Young becoming agent general of reparation payments.
Nikolai Lenin, Russian premier, died Jan. 21.
Former President Wilson died at Washington, Feb. 3.
Three American army airplanes circumnavigated globe, March 16 to Sept. 28.
Restricted immigration law signed May 26.
Federal trade commission issued cease-and-desist order on Pittsburgh plus quoting of steel. Steel corporation accepted decree Sept. 21.
Hugo Stinnes, German steel potentate died in April.
Department of commerce stressed simplification and industrial waste elimination.

1925

William E. Humphrey, federal trade commissioner in May issued business noninterference policy of that body.
Anthracite coal strike started Aug. 31, 150,000 Pennsylvania miners affected. Strike ended February, 1926.
United States Supreme Court decides against Chicago Great Lakes water diversion.
Henry Ford started airplane freight line, Detroit to Chicago.
Italian war debt to United States funded.
Locarno peace pact restores faith in European concord.
Roumanian war debt funding settled.

Iron, Steel Production Mounts Rapidly

Ore, Pig Iron and Coke

Year	Iron Ore Tons	Blast Furnaces Built or building	Blast Furnaces In blast Dec. 31	Pig Iron Tons	Bessemer Tons	Charcoal Iron Tons	Coke Tons	By-Product Coke Tons	Per Cent of Total	Year
1900	27,553,161	406	232	13,789,242	7,979,327	339,874	20,533,348	1,075,727	5.24	1900
1901	28,887,479	406	266	15,878,354	9,596,793	360,147	21,795,883	1,179,900	5.41	1901
1902	35,554,135	412	307	17,821,307	10,393,168	378,504	25,401,730	1,403,588	5.53	1902
1903	35,019,308	425	182	18,009,252	9,989,908	504,757	25,262,360	1,882,394	7.45	1903
1904	27,600,000	429	261	16,497,033	9,098,659	337,529	23,621,520	2,608,229	11.02	1904
1905	42,526,133	424	313	22,992,380	12,407,116	352,928	32,231,129	3,462,348	10.74	1905
1906	47,749,728	429	340	25,307,191	13,840,518	433,007	36,401,217	4,558,127	12.52	1906
1907	51,720,619	443	167	25,781,361	13,231,620	437,397	40,779,564	5,607,899	13.75	1907
1908	35,983,336	459	236	15,936,018	7,216,976	249,146	26,033,518	4,201,226	16.14	1908
1909	51,294,271	469	338	25,795,471	10,557,370	376,003	39,315,065	6,254,644	15.91	1909
1910	57,014,906	474	206	27,303,567	11,245,642	396,507	41,708,810	7,138,734	17.12	1910
1911	43,876,552	465	231	23,649,547	9,409,303	278,676	35,551,489	7,847,845	22.07	1911
1912	55,150,147	466	313	29,726,937	11,664,015	347,025	43,983,599	11,115,164	25.27	1912
1913	61,980,437	462	205	30,966,152	11,590,113	339,981	46,299,530	12,714,700	27.46	1913
1914	41,439,761	451	164	23,332,244	7,859,127	263,924	34,555,914	11,219,943	32.47	1914
1915	55,526,490	445	310	29,916,213	10,523,306	296,152	41,581,150	14,072,895	33.84	1915
1916	75,167,672	448	333	39,434,797	14,422,457	372,411	54,533,585	19,069,361	34.97	1916
1917	75,288,851	455	339	38,621,216	13,714,732	376,525	55,606,828	22,439,280	40.35	1917
1918	69,658,278	459	360	39,054,644	13,024,966	348,877	56,478,372	25,997,580	46.03	1918
1919	60,965,418	453	280	31,015,364	9,975,934	327,097	44,180,557	25,137,621	56.90	1919
1920	67,604,465	452	216	36,925,987	12,062,084	323,396	51,345,043	30,833,951	60.05	1920
1921	29,282,690	450	125	16,688,126	5,595,215	94,730	25,287,622	19,749,580	78.10	1921
1922	47,128,527	449	263	27,219,904	7,813,203	224,731	37,124,012	28,550,545	76.91	1922
1923	69,351,442	432	239	40,361,146	11,677,509	251,177	56,977,534	37,597,664	65.99	1923
1924	54,267,419	425	235	31,405,790	8,172,297	212,710	43,663,000	33,983,568	77.83	1924
1925	62,079,000*	385	234	36,370,404*	.....	.....	45,567,000**	36,223,000**	79.49**	1925

* Estimated. ** Jan. 1 through Nov. 30.

Rolled Steel
Gross tons

Year	All rolled steel	Bars Merchant after 1909	Bars Concrete bars	Skelp	Other rolled steel	Plates and sheets	Nail plate	Structural shapes	Cut nails In number of	Wire nails 100 lb. kegs	Tin plate	Year
1900	9,487,443	3,575,536	Included	Totals	Totals	1,794,528	70,245	815,161	1,573,494	7,233,979	302,665	1900
1901	12,349,327	4,772,329	with	included	included	2,254,425	68,850	1,013,150	1,542,240	9,803,822	399,291	1901
1902	13,944,116	5,383,219	bars	with bars	with bars	2,665,409	72,936	1,300,326	1,633,762	10,982,246	366,000	1902
1903	13,207,697	4,952,185	until	until	until	2,599,665	64,102	1,095,813	1,435,893	9,631,661	480,000	1903
1904	12,013,381	4,597,497	1909	1909	1909	2,421,398	61,601	949,146	1,283,362	11,926,661	458,000	1904
1905	13,464,086	6,398,107	.....	1,435,995	.....	3,532,230	64,542	1,660,519	1,357,549	10,854,892	493,500	1905
1906	15,610,581	7,383,828	.....	1,528,585	.....	4,182,156	54,211	2,118,772	1,189,239	11,486,647	577,562	1906
1907	19,864,822	7,972,374	.....	1,802,627	.....	4,248,832	52,027	1,940,352	1,109,138	11,731,044	514,775	1907
1908	11,828,193	4,311,608	.....	1,150,583	.....	2,649,693	45,747	1,083,181	956,182	10,662,972	537,087	1908
1909	19,644,690	3,263,531	159,352	2,033,381	2,255,242	4,234,346	63,746	2,275,562	1,207,597	13,916,053	611,959	1909
1910	21,621,279	3,785,731	241,109	1,828,194	2,620,716	4,955,484	45,294	2,266,890	1,005,233	12,704,902	722,770	1910
1911	19,039,171	3,047,362	258,741	1,980,673	2,030,214	4,488,049	48,522	1,912,367	967,636	13,437,778	783,960	1911
1912	24,656,841	3,697,114	274,332	2,446,816	3,490,213	5,875,080	45,331	2,846,487	978,415	14,659,700	962,971	1912
1913	24,791,243	3,957,609	319,670	2,501,964	3,250,901	5,751,037	37,503	3,004,972	842,038	13,559,727	823,719	1913
1914	18,370,196	2,523,631	288,471	1,982,431	2,409,911	4,719,246	38,573	2,031,124	769,665	13,132,814	931,241	1914
1915	24,392,924	4,131,242	353,408	2,299,464	3,762,074	6,077,694	31,929	2,437,003	775,327	14,583,026	1,055,936	1915
1916	32,380,389	6,230,302	461,400	2,927,674	.....	7,453,980	30,088	3,029,964	764,835	17,147,665	1,235,000	1916
1917	33,067,700	6,209,957	471,184	2,674,231	.....	8,267,616	22,864	3,110,000	461,674	17,040,666	1,512,146	1917
1918	31,155,754	6,242,749	344,620	2,564,011	.....	8,799,135	18,310	2,849,969	418,811	12,279,800	1,473,939	1918
1919	25,101,544	4,391,624	419,021	2,555,778	.....	7,372,814	12,832	2,614,036	394,477	13,094,221	1,151,347	1919
1920	32,347,863	6,130,240	572,445	3,220,289	.....	9,337,680	20,577	3,306,748	844,583	16,449,506	1,445,545	1920
1921	14,774,006	1,565,754	227,228	1,930,575	.....	4,260,574	14,573	1,272,624	538,834	11,889,412	794,274	1921
1922	26,452,004	3,978,658	575,816	2,872,215	.....	7,968,397	21,969	2,718,768	810,206	15,053,330	1,287,895	1922
1923	33,277,076	5,552,796	680,867	3,734,336	.....	9,497,717	22,833	3,405,197	829,604	17,672,582	1,506,862	1923
1924	28,086,435	4,280,921	656,122	3,170,543	.....	8,087,883	22,175	3,283,708	741,668	15,101,318	1,418,654	1924
1925	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1925

Steel Ingots and Castings
Gross Tons

Year	Total	Bessemer	Open Hearth	Crucible	Electric	Year
1900	10,188,329	6,684,770	3,398,135	100,562	.....	1900
1901	13,473,595	8,713,302	4,656,309	98,513	.....	1901
1902	14,947,250	9,138,363	5,687,729	112,772	.....	1902
1903	14,534,978	8,592,829	5,829,911	102,434	.....	1903
1904	13,859,887	7,859,140	5,908,166	83,391	.....	1904
1905	20,023,947	10,941,375	8,971,376	102,233	.....	1905
1906	23,398,136	12,275,830	10,980,413	127,513	.....	1906
1907	23,362,594	11,667,549	11,549,736	131,234	.....	1907
1908	14,023,247	6,116,755	7,836,729	63,631	.....	1908
1909	23,955,021	9,330,783	14,493,936	107,355	13,762	1909
1910	26,094,919	9,412,772	16,504,509	122,303	52,141	1910
1911	23,676,106	7,947,854	15,598,650	97,653	29,105	1911
1912	31,251,303	10,327,901	20,780,723	121,517	18,309	1912
1913	31,300,874	9,545,706	21,599,931	121,226	30,180	1913
1914	23,513,030	6,220,846	17,174,684	89,869	24,009	1914
1915	32,151,036	8,287,213	23,679,102	113,782	69,412	1915
1916	42,773,680	11,059,039	31,415,427	129,692	168,918	1916
1917	45,060,607	10,479,960	34,148,893	126,716	304,543	1917
1918	44,462,432	9,376,236	34,459,391	115,112	511,364	1918
1919	34,671,232	7,271,562	26,948,694	63,572	384,452	1919
1920	42,132,934	8,883,087	32,671,895	72,265	502,152	1920
1921	19,783,797	4,015,938	15,589,802	7,613	169,499	1921
1922	35,602,926	5,919,298	29,308,983	28,606	346,039	1922
1923	44,943,696	8,484,088	35,899,657	44,079	515,872	1923
1924	37,931,939	5,899,590	31,577,350	22,473	432,526	1924
1925	44,186,977	7,053,303†	36,955,700	.....	177,974††	1925

Rails
Gross Tons

Year	Total All Rails	Bessemer	Open Hearth	Iron	Re-rolled**	Electric Steel**	Year
1900	2,385,682	2,383,654	1,333	695	.....	.....	1900
1901	2,874,639	2,870,816	2,093	1,730	.....	.....	1901
1902	2,947,933	2,935,392	6,029	6,512	.....	.....	1902
1903	2,992,477	2,946,756	45,054	667	.....	.....	1903
1904	2,284,711	2,137,957	145,883	871	.....	.....	1904
1905	3,375,929	3,192,347	183,264	318	.....	.....	1905
1906	3,977,887	3,791,459	186,413	15	.....	.....	1906
1907	3,633,654	3,380,025	252,704	925	.....	.....	1907
1908	1,921,611	1,349,153	571,791	71	.....	.....	1908
1909	3,023,845	1,767,171	1,256,674	....	.....	.....	1909
1910	3,636,031	1,884,442	1,751,359	230	.....	.....	1910
1911	2,822,790	1,053,420	1,676,923	234	91,751	462	1911
1912	3,327,915	1,099,926	2,105,144	....	119,390	3,455	1912
1913	3,502,780	817,591	2,527,710	....	155,043	2,436	1913
1914	1,945,095	323,897	1,525,851	....	95,169	178	1914
1915	2,204,203	326,952	1,775,168	....	102,083	.....	1915
1916	2,854,518	440,092	2,269,600	....	144,826	.....	1916
1917	2,944,161	533,325	2,292,197	....	118,639	.....	1917
1918	2,540,892	494,193	1,945,443	....	101,256	.....	1918
1919	2,203,843	214,121	1,893,250	....	96,422	50	1919
1920	2,604,116	142,899	2,334,222	....	126,698	297	1920
1921	2,178,818	55,559	2,027,215	....	96,039	5	1921
1922	2,171,776	22,317	2,033,000	....	116,459	.....	1922
1923	2,904,516	25,877	2,738,779	....	139,742	118	1923
1924	2,433,332	16,069	2,307,533	....	109,730	.....	1924
1925	3,251,898†	.....	.....	....	.....	.....	1925

**Included with Bessemer until 1911. †Estimated. ††Includes crucible, electric and all other.

Miscellaneous Data Shows Industry's Rise

MISCELLANEOUS CONSTRUCTION

	Railroads				Ships		Automobiles		
Year	Freight cars constructed	Monthly average freight car shortage* or surplus	Miles of track laid	Miles track being operated	Vessels built Gross Tons	Gross Tons registered	Built	Number Registered	Year
1900	.....	.....	4,894	193,346	393,790	5,164,839	5,000	8,000	1900
1901	.....	.....	5,368	197,237	483,489	5,524,218	7,000	14,800	1901
1902	.....	.....	6,026	202,472	468,831	5,797,902	9,000	23,000	1902
1903	.....	.....	5,652	207,977	436,152	6,087,345	11,235	32,920	1903
1904	.....	.....	3,832	213,904	378,542	6,291,535	22,830	55,000	1904
1905	.....	.....	4,388	218,101	330,316	6,456,543	25,000	78,000	1905
1906	.....	.....	5,623	224,363	418,745	6,674,969	34,000	107,000	1906
1907	.....	.....	5,212	229,951	471,332	6,938,794	44,000	142,000	1907
1908	.....	.....	3,214	223,468	614,216	7,365,445	65,000	197,000	1908
1909	.....	.....	3,748	236,834	238,090	7,388,755	130,986	312,000	1909
1910	.....	.....	4,122	240,293	342,068	7,508,082	187,000	468,500	1910
1911	.....	.....	3,066	243,979	291,162	7,638,790	210,000	639,500	1911
1912	.....	.....	2,997	246,777	232,669	7,714,183	378,000	944,000	1912
1913	100,000	.....	3,071	249,777	346,155	7,886,551	485,000	1,258,062	1913
1914	71,250	.....	1,532	252,105	316,250	7,828,688	569,054	1,711,339	1914
1915	110,000	.....	933	253,789	225,122	8,389,429	892,618	2,445,666	1915
1916	174,675	.....	1,098	254,251	325,413	8,469,649	1,617,708	3,512,996	1916
1917	148,250	943,000*	979	254,037	664,479	8,871,037	1,868,949	4,983,340	1917
1918	201,780	163,000	721	253,626	1,300,868	9,924,518	1,153,638	6,146,617	1918
1919	20,045	1,924,000	686	253,529	3,326,621	12,907,300	1,874,016	7,565,446	1919
1920	80,000	768,000*	314	253,152	3,880,639	16,324,024	2,205,197	9,231,941	1920
1921	22,050	3,138,000	475	252,845	2,265,115	17,026,002	1,661,550	10,463,295	1921
1922	180,465	1,517,000	324	251,176	661,232	16,986,196	2,659,064	12,238,375	1922
1923	103,487	106,000	427	250,413	335,791	16,952,018	4,086,997	15,092,177	1923
1924	144,425	2,360,000	579	250,222	223,968	15,956,967	3,617,602	17,591,981	1924
1925	77,110	2,412,000	....	.....	199,846	15,377,480	4,314,000	.....	1925

NONFERROUS AND MISCELLANEOUS PRODUCTION

Year	Aluminum Pounds	Crude petroleum gallons	Copper Long Tons	Lead Short Tons	Zinc-Crude Short Tons	Fabricated structural steel Bookings	Steel castings Bookings	Value Building contracts awarded* in $1,000,000	Year
1900	7,150,000	2,672,062,218	270,588	270,824	123,886	.....	.....	....	1900
1901	.....	2,914,346,148	268,782	270,700	140,822	.....	.....	....	1901
1902	.....	3,728,210,472	294,423	270,000	156,927	.....	.....	....	1902
1903	.....	4,219,376,154	311,627	282,000	159,219	.....	.....	....	1903
1904	.....	4,917,400,320	362,739	307,000	186,702	.....	.....	....	1904
1905	.....	5,658,138,360	402,637	307,514	203,849	.....	.....	....	1905
1906	.....	5,312,745,312	409,735	236,200	199,694	.....	.....	....	1906
1907	.....	6,976,004,070	387,945	352,381	123,745	.....	.....	....	1907
1908	.....	7,498,848,910	420,791	311,666	290,749	.....	.....	....	1908
1909	.....	7,693,176,708	487,925	352,839	230,225	.....	.....	....	1909
1910	47,734,000	8,801,404,415	482,214	375,402	252,479	.....	.....	806	1910
1911	46,125,000	9,258,874,422	489,836	391,995	271,621	.....	.....	788	1911
1912	65,607,000	9,363,271,848	555,031	392,517	323,907	.....	.....	868	1912
1913	72,379,000	10,434,471,660	546,645	411,878	337,252	1,260,000	605,592	858	1913
1914	79,129,000	11,162,026,470	513,454	512,794	343,418	1,266,000	458,238	720	1914
1915	16,280,000	11,806,372,368	619,647	507,026	458,135	1,797,600	676,144	940	1915
1916	33,900,000	12,632,220,636	860,648	552,228	564,338	1,838,160	1,061,399	1,357	1916
1917	45,882,000	14,083,255,242	842,018	548,450	584,597	1,663,200	895,388	1,618	1917
1918	41,159,000	14,948,964,072	852,024	539,905	492,405	1,639,680	1,133,910	1,689	1918
1919	38,558,000	15,864,198,000	575,294	424,433	452,272	1,602,720	435,066	2,580	1919
1920	41,375,000	18,622,884,000	539,759	476,849	450,045	1,684,800	793,305	2,565	1920
1921	10,906,000	19,831,686,000	225,708	398,222	198,232	1,113,000	287,674	2,355	1921
1922	13,622,000	23,416,302,000	424,235	468,746	353,274	2,181,120	785,059	3,344	1922
1923	28,305,000	30,861,094,000	640,625	543,841	508,335	2,188,800	894,780	3,505	1923
1924	37,607,000	29,705,130,000	955,745	556,407	515,831	2,426,040	772,840	3,877	1924
1925	.....	31,849,020,000	755,803**	680,000**	712,000**	2,708,400	731,743	4,203	1925

*Reports of F. W. Dodge Corp. for 27 northeastern states. **Estimated

MISCELLANEOUS STATISTICS

	Unfilled Orders, United States Steel Corp.			Iron and Steel Imports Gross Tons			Iron and Steel Exports Gross Tons			
Year	Tons on books Dec. 31	Changes over Nov. 30	Total	Pig Iron	Scrap	Total	Pig Iron	Billets, Ingots, Blooms	Steel Rails	Year
1900	....	....	209,955	52,565	34,431	1,154,284	286,687	107,385	356,245	1900
1901	....	....	221,297	62,930	20,130	700,852	81,211	28,614	318,055	1901
1902	5,347,253	504,246+	1,212,484	619,354	109,510	1,103,664	27,487	2,409	67,455	1902
1903	3,215,123	513,619—	1,178,797	599,574	82,921	326,590	20,379	5,445	30,656	1903
1904	4,696,203	1,668,767+	266,398	79,500	13,461	1,167,674	49,025	314,324	414,845	1904
1905	7,605,086	901,357+	416,000	212,465	23,731	1,011,255	49,221	237,638	295,023	1905
1906	8,489,718	552,834+	557,809	379,828	19,091	1,325,740	83,317	192,616	328,036	1906
1907	4,624,553	1,800,455—	662,358	489,475	27,652	1,301,981	73,703	79,991	338,906	1907
1908	3,603,527	181,550+	205,845	92,202	5,090	964,242	46,696	112,177	196,510	1908
1909	5,927,031	1,130,192+	363,984	176,442	63,504	1,243,583	61,989	104,862	299,540	1909
1910	2,674,757	85,656—	510,730	237,233	72,764	1,537,943	127,385	58,230	353,180	1910
1911	5,084,761	942,806+	262,457	148,459	17,272	2,187,725	120,799	234,267	420,874	1911
1912	7,932,164	79,281+	225,072	129,325	23,612	2,947,596	272,676	294,818	446,473	1912
1913	4,282,108	114,239—	317,260	156,435	44,153	2,745,635	277,648	91,847	460,553	1913
1914	3,836,643	512,051+	289,775	139,683	34,849	1,549,554	114,423	50,496	174,680	1914
1915	7,806,220	616,731—	282,396	89,836	79,982	3,532,564	224,509	560,704	391,379	1915
1916	11,547,286	488,744—	328,965	135,349	125,133*	6,110,732	607,236	1,508,727	540,349	1916
1917	9,381,718	484,612+	330,301	76,786	188,567*	6,465,053	656,220	2,017,113	512,669	1917
1918	7,379,152	745,511—	169,110	34,711	70,149*	5,338,019	269,575	1,786,189	453,537	1918
1919	8,265,366	1,137,036+	322,264	101,665	182,549*	4,397,295	321,261	258,424	652,443	1919
1920	8,148,122	873,359—	421,274	185,944	140,645*	4,934,087	216,828	216,873	594,628	1920
1921	4,268,414	17,872+	135,825	44,842	41,469	2,150,276	28,405	10,171	321,822	1921
1922	6,745,703	94,539—	712,895	383,445	142,969	2,005,100	30,920	14,029	277,090	1922
1923	4,445,339	76,755+	734,734	367,778	162,068	2,009,141	32,318	6 704	267,409	1923
1924	4,816,676	784,707+	556,281	209,109	66,841	1,805,064	41,483	96,155	208,829	1924
1925	5,033,364	451,584+	943,240	441,425	99,815	1,762,571	32,674	87,478	151,690	1925

*Includes tin plate scrap.

Quarter Century of Prices

Quotations on Representative Products Show Fluctuations Through the Years

Basic, Pittsburgh, 1902-1925

Per Gross Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1925.....	$23.66	$23.76	$23.16	$21.96	$20.66	$19.96	$19.76	$19.76	$20.06	$20.56	$21.66	$21.76
1924.....	23.16	23.76	23.46	23.46	22.46	21.76	20.76	20.76	20.76	20.76	21.01	22.26
1923.....	27.67	27.87	31.57	32.77	31.57	29.12	26.92	26.77	26.77	25.52	22.57	22.77
1922.....	20.31	19.81	19.86	22.21	26.46	26.96	26.76	27.96	34.27	32.37	29.77	26.77
1921.....	31.46	28.71	26.56	24.81	23.96	23.16	20.81	20.96	21.56	21.16	20.96	20.71
1920.....	39.20	43.65	44.40	44.40	44.65	45.15	47.40	49.40	50.45	47.21	39.46	34.96
1919.....	31.00	31.40	30.35	27.15	27.15	27.15	27.15	27.15	27.15	27.15	30.40	35.40
1918.....	33.95	33.95	33.95	32.95	32.95	33.20	33.40	33.40	33.40	34.40	34.40	34.40
1917.....	30.95	30.95	32.85	39.20	42.14	50.20	53.20	52.75	43.95	33.95	33.95	33.95
1916.....	19.20	18.77	19.20	19.20	18.95	18.95	18.95	18.95	19.08	20.83	25.95	30.95
1915.....	13.45	13.45	13.45	13.45	13.45	13.54	13.83	14.89	15.65	15.95	16.70	18.55
1914.....	13.42	14.09	13.96	13.90	13.90	13.90	13.90	13.90	13.90	13 75	13.45	13.45
1913.....	17.40	17.29	17.03	16.77	16.15	15.46	15.25	15.07	15.09	14.85	14.09	13.65
1912.....	13.28	13.30	13.44	14.00	13.00	13.40	14.40	14.85	15.33	16.95	17.12	17.40
1911.....	14.40	14.46	14.46	14.46	14.32	14.12	13.77	13.90	13.70	13.42	13.37	13.26
1910.....	17.90	17.77	17.20	16.65	16.20	15.70	15.27	14.95	14.70	13.96	14.28	14.20
1909.....	16.75	16.50	16.00	15.75	15.00	15.50	15.75	17.00	18.00	18.50	18.50	18.75
1908.....	17.25	16.90	16.90	16.50	16.40	16.25	16.00	15.90	15.50	15.10	16.40	16.40
1907.....	23.05	22.85	22.85	22.85	23.65	24.15	23.25	22.20	21.40	20.65	19.25	18.40
1906.....	18.20	17.95	17.85	17.85	17.85	17.85	17.95	18.40	18.95	20.70	22.20	22.85
1905.....	16.75	16.35	16.15	16 10	16.10	15.55	14.90	15.20	15.75	16.20	17.85	18.10
1904.....	13.70	13.35	13.75	13.95	13.35	12.50	12.20	12.60	12.50	12.90	14.80	20.40
1903.....	21.80	22.10	21 95	21.45	20 20	20.00	19.40	16.20	16.85	15.95	15.00	13.95
1902.....	20.60	17.00	17.35	18.35	16.60	21.50	21.45	21.45	21.50	21.55	21.75	21.75

No. 2 Foundry, Chicago, 1900-1925

Per Gross Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1925.....	$23.80	$24.00	$24.00	$22.60	$21.25	$20.25	$20.30	$20.50	$21.10	$21.60	$22.75	$23.00
1924.....	23.70	24.40	24.50	24.40	22.80	21.40	19.80	20.40	20.50	20.50	21.00	22.00
1923.....	28.80	29.75	31.25	32.50	32.50	31.25	28.00	27.10	26.75	25.60	23.30	23.00
1922.....	19.00	18.90	20.00	20.50	22.60	23.25	24.65	28.60	32.00	31.75	30.60	28.00
1921.....	32.75	28.65	25.80	24.25	23.00	21.10	19.15	19.60	21.75	21.50	21.00	20.00
1920.....	40.00	42.25	43.00	43.00	43.00	43.00	44.40	46.00	46.00	46.00	42.40	36.50
1919.....	31.00	31.00	29.95	26.75	26.75	26.75	26.75	26.75	26.75	31.75	31.75	38.30
1918.....	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917.....	30.00	31.25	35.70	39.25	43.20	51.00	55.00	55.00	49.50	33.00	33.00	33.00
1916.....	18.50	18.50	18.70	19.00	19.00	19.00	19.00	19.00	18.65	19.15	25.00	29.25
1915.....	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.40	13.80	14.45	17.10	18.00
1914.....	14.25	14.20	14.25	14.25	14.25	14.20	14.00	14.00	13.65	13.30	13.00	13.00
1913.....	18.00	18.00	17.60	17.25	16.70	16.10	15.20	15.00	15.00	15.00	15.00	14.50
1912.....	14.00	14.00	14.00	14.25	14.50	14.50	14.60	15.30	16.35	17.30	17.85	18.00
1911.....	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.50	14.50	14.50	14.00	14.00
1910.....	19.00	18.75	18.25	17.00	16.75	16.50	16.50	16.50	16.50	16.00	16.00	16.00
1909.....	17.45	16.75	16.50	16.45	16.20	16.40	16.90	17.35	18.20	18.85	19.00	19.00
1908.....	18.25	17.85	17.40	17.20	17.00	17.30	17.00	17.00	16.75	16.50	16.75	17.35
1907.....	26.00	26.50	26.75	27.50	27.40	26.50	25.40	24.50	23.60	22.60	20.60	19.00
1906.....	19.25	19.25	19.00	18.75	18.50	18.10	18.30	18.90	19.75	21.50	26.50	27.00
1905.....	17.50	17.50	17.50	17.50	17.25	16.60	16.15	16.35	16.50	17.55	18.90	19.50
1904.....	14.10	13.75	13.55	14.00	13.80	13.40	13.30	13.35	13.40	13.70	15.60	16.60
1903.....	25.00	24.00	24.00	23.00	21.70	20.50	18.50	17.50	16.85	15.90	14.50	14.30
1902.....	15.80	16.75	18.60	19.75	21.75	22.50	23.40	24.65	27.15	27.15	26.90	25.40
1901.....	14.60	14.10	15.20	15.50	15.50	15.50	15.50	15.20	15.00	15.00	15.00	15.50
1900.....	24.50	24.50	23.75	23.25	22.00	20.25	17.75	15.50	14.50	14.00	14.25	14.60

Open-hearth Billets, Pittsburgh, 1910-1925

Per Net Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1925.....	$37.75	$37.65	$37.75	$35.80	$35.40	$33.90	$35.00	$35.00	$35.00	$35.00	$35.00	$35.00
1924.....	40.00	40.00	40.00	40.00	39.20	38.00	38.00	38.00	37.10	36.60	35.50	35.50
1923.....	37.50	38.85	44.50	46.00	45.00	42.90	42.50	42.50	42.50	41.50	41.50	40.00
1922.....	29.00	28.00	28.30	30.10	34.50	35.00	35.00	35.00	39.50	40.00	38.80	36.50
1921.....	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	29.00	29.00
1920.....	49.60	61.25	66.25	70.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919.....	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918.....	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917.....	60.00	62.50	67.00	72.50	85.00	93.75	100.00	93.00	73.75	58.75	47.50	47.50
1916.....	34.75	35.00	40.60	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915.....	19.50	19.50	19.50	19.50	19.50	19.85	21.50	24.00	25.60	26.50	28.00	30.20
1914.....	20.00	20.75	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
1913.....	28.70	29.40	29.50	29.50	28.10	26.50	26.50	26.10	25.00	23.00	20.85	20.00
1912.....	19.75	19.50	19.40	20.25	21.00	21.25	21.75	21.75	21.75	21.75	21.75	28.00
1911.....	23.00	23.00	23.00	23.00	22.00	21.00	21.00	21.00	20.25	19.50	19.75	19.25
1910.....	28.00	28.00	28.50	28.75	28.75	27.00	26.50	26.00	25.00	24.00	23.25	23.00

Heavy Melting Steel, Pittsburgh, 1902-1925

Per Gross Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1925	**$22.10**	**$19.00**	**$18.25**	**$17.00**	**$16.60**	**$17.10**	**$17.20**	**$19.25**	**$19.00**	**$18.40**	**$19.50**	**$19.00**
1924	**21 10**	**21.60**	**19.75**	**16.60**	**15 40**	**16.25**	**17.30**	**17.75**	**18.60**	**18.20**	**19.85**	**21.00**
1923	21.65	23.40	26.10	25.85	22.50	20.50	18.25	17.50	18.00	16.10	15.70	18.50
1922	14.50	14.70	14.95	16.50	17.00	16.85	16.50	17.10	19.50	21.35	20.30	20.00
1921	15.00	15.00	15 00	13 00	13.60	13.10	12.00	12.60	11.30	14.00	14.25	14.25
1920	26.50	28.15	28 00	26.40	25.50	25.30	25.70	27.75	28.60	28.00	24.00	18.75
1919	20.80	17 00	14.60	15.75	15.55	17.25	19.90	21.25	20.50	20.00	21.90	24.65
1918	30.00	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29 00	29.00	29.00
1917	23.25	21.50	23.40	28.15	28.40	40.00	40.25	36.60	35.50	31.30	29.60	30.00
1916	17.50	17.35	17.95	18.10	17.10	16.25	16.25	16.00	16.10	17.80	20.55	26.75
1915	11.55	11 60	12 00	11.90	11.75	11.75	11.75	13.38	14.25	14.00	15.30	17.40
1914	11.30	12.15	12.40	12.25	12.00	12.00	12.00	11.65	11.65	11.40	10.40	10.45
1913	15.15	14.90	14.40	14.40	14.15	13.50	12.75	12.65	12.65	12.65	11.75	11.20
1912	12.50	12.65	12.40	13.00	13.40	13.40	13.65	13.55	13.90	14.40	15.30	15.00
1911	13.50	14.30	14.40	13.50	12.75	13.15	12.90	13.40	13.15	12.25	12.15	12.50
1910	17.90	17.65	17 00	17.00	16.00	15.25	14.50	14.25	14.25	14.40	14.15	13.75
1909	16.50	16.00	14 75	14.15	14.95	15.50	15.75	16.00	16.75	17.90	18.15	17.95
1908	13.25	13.25	13 50	12.75	12.75	13.00	13.25	14.75	14.75	14.50	14.75	16.25
1907	19.25	18.75	18.25	18.25	18.15	18.65	18.50	18.25	17.75	17.50	15.45	13.75
1906	17.75	16.65	15.90	14.65	15.25	15.00	15.75	16.00	16.90	16.75	17.25	19.75
1905	16.75	16 15	16.50	16.50	15.40	14.50	14.25	14.15	15.40	16.20	17.15	18.25
1904	12.65	13.25	13.75	14.15	13.05	11.50	10.75	11.15	11.75	12.00	13.65	14.90
1903	22.25	21.75	21.25	22.15	21.65	20.50	20.25	18.75	18.25	16.00	14.50	11.50
1902	17.25	17.45	18.55	19.40	20.25	21.40	22.25	21.25	21.25	21.65	21.15	22.25

Steel Bars, Pittsburgh, 1901-1925

Per Pound

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1925	**2.10c**	**2.10c**	**2.10c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**
1924	**2.40**	**2.40**	**2.40**	**2.30**	**2.25**	**2.20**	**2.15**	**2.10**	**2.05**	**2.00**	**2.05**	**2.10**
1923	2.00	2.15	2.30	2.35	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
1922	1.50	1.40	1.45	1.50	1.60	1.65	1.70	1.80	2.00	2.00	2.00	2.00
1921	2.35	2.15	2.00	2.05	2.10	2.05	1.85	1.75	1.65	1.60	1.55	1.50
1920	3.10	3.85	3.85	3.65	3.25	3.25	3.25	3.25	3.25	3.25	3.00	2.35
1919	2.70	2.70	2.60	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.45	2.90
1918	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
1917	3.20	3.20	3.45	3.65	3.65	4.00	4.70	4.75	4.25	2.90	2.90	2.90
1916	2.40	2.40	2.65	3.00	3.00	2.85	2.75	2.55	2.60	2.70	2.95	3.15
1915	1.10	1.10	1.15	1.20	1.20	1.20	1.30	1.35	1.30	1.45	1.70	1.90
1914	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.20	1.15	1.10	1.10
1913	1.45	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.35	1.25
1912	1.15	1.15	1.10	1.15	1.20	1.20	1.25	1.30	1.35	1.40	1.40	1.40
1911	1.40	1.40	1.40	1.40	1.40	1.25	1.25	1.20	1.15	1.10	1.10	1.10
1910	1.50	1.45	1.45	1.45	1.45	1.45	1.45	1.40	1.40	1.40	1.40	1.40
1909	1.40	1.30	1.20	1.15	1.20	1.20	1.25	1.35	1.40	1.40	1.45	1.50
1908	1.60	1.60	1.60	1.60	1.60	1.50	1.40	1.40	1.40	1.40	1.40	1.40
1907	1.60	1.60	1.60	1.60	1.60	1 60	1.60	1.60	1.60	1.60	1.60	1.60
1906	2.00	1.75	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.60
1905	1.45	1.45	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.70	1.80	1.95
1904	1.30	1.30	1.35	1.35	1.30	1.30	1.30	1.30	1.35	1.30	1.30	1.40
1903	1.65	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.35	1.30
1902	1.60	1.50	1.50	1.65	1.80	1.80	1.70	1.75	1.75	1.70	1.60	1.70
1901	1.20	1.25	1.45	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.60

Tin Plate, Pittsburgh, 1903-1925

Per Base Box, 100 lbs., Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1925	$5.50	$5.50	$5.50	$5.50	$5.50	$5.50	$5.50	$5.50	$5.50	$5.50	$5.50	$5.50
1924	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1923	4.75	4.75	4.95	4.95	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1922	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75
1921	7.00	7.00	7.00	6.65	6.25	6.25	5.65	5.25	5.15	5.00	4.80	4.75
1920	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1919	7.35	7.35	7.25	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1918	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75
1917	6.90	7.00	7.50	7.50	7.90	9.25	10.00	10.00	10.00	10.00	8.20	7.75
1916	3.75	3.75	4.15	4.70	5.15	5.55	5.80	6.00	5.60	5.75	6.05	6.50
1915	3.10	3.10	3.10	3.20	3.20	3.10	3.10	3.10	3.10	3.10	3.35	3.60
1914	3.40	3.40	3.40	3.40	3.40	3.30	3.25	3.45	3.55	3.35	3.15	3.20
1913	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.55	3.50	3.40
1912	3.40	3.40	3.50	3.50	3.50	3.50	3.50	3.70	3.70	3.70	3.70	3.60
1911	3.70	3.70	3.70	3.60	3.60	3.60	3.60	3.50	3.50	3.40	3.40	3.40
1910	3.50	3.50	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
1909	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.50	3.50	3.50
1908	3.60	3.60	3.60	3.60	3.60	3.50	3.50	3.50	3.50	3.50	3.50	3.40
1907	3.90	3.90	3.90	3.90	3.80	3.80	3.70	3.70	3.70	3.60	3.60	3.60
1906	3.50	3.50	3.50	3.60	3.70	3.70	3.80	3.90	3.90	3.90	4.00	4.00
1905	3.50	3.50	3.50	3.50	3.50	3.40	3.40	3.40	3.30	3.30	3.40	3.50
1904	3.40	3.40	3.30	3.30	3.20	3.20	3.20	3.10	3.30	3.40	3.50	3.50
1903	3.80	3.80	3.90	3.90	3.80	3.80	3.70	3.70	3.60	3.60	3.60	3.50

Rail Steel Bars, Chicago, 1918-1925

Per Pound

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1925	**2.03c**	**2.13c**	**2.07c**	**2.00c**	**2.10c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**	**2.00c**
1924	**2.30**	**2.30**	**2.30**	**2.30**	**2.20**	**2.15**	**2.10**	**2.05**	**2.05**	**2.00**	**2.00**	**2.00**
1923	2.00	2.00	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
1922	1.60	1.50	1.50	1.55	1.65	1.65	1.70	1.80	1.95	2.00	2.00	2.00
1921	2.50	2.50	2.50	2.15	2.00	2.00	1.95	1.85	1.85	1.75	1.70	1.65
1920	2.90	3.20	3.35	3.70	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
1919	2.80	2.80	2.80	2.55	2.45	2.45	2.45	2.55	2.55	2.55	2.75	2.85
1918	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Methods of Making and Rolling Steel Improve

(*Concluded from Page* 777)

country has applied electricity so successfully as the steel industry. Among the first reversing motors to be installed in this country was one completed in 1904 for driving a two-high universal plate mill at the South works of the Illinois Steel Co. During the same year two 1500-horsepower motors were installed at the Edgar Thomson plant of the Carnegie Steel Co. for driving the No. 3 rail mill, and these motors marked the beginning of this practice in America.

During 1908 the Grey-type structural mill designed to roll wide flange girder and H-beams was installed at the Bethlehem Steel Co. Although electric motors had been used for some time before 1909 to drive rolls, the motors installed in that year at the Gary plant of the Indiana Steel Co. now a subsidiary company of the corporation, were several times larger than any motor of their type built previously.

While the mechanical doubling machine, equipped with automatic matching fingers, was devised about 1912 to lighten the work of hot mill crews, it did not come into prominence until about 1921. The development of this particular machine effected the first outstanding change in hot mill practice since the tin plate industry became established in this country in 1890. The following year, or 1922, the automatic tin pot feeder was developed and today numerous tin houses in this country are equipped with these units or are making preparation for their installation. The same year electric heater first was used by the Inland Steel Co. to warm up sheet mill rolls.

Manipulator Design Improved

A new departure in the design of rolling mill manipulators was accomplished during 1925, wherein the desirable features of quick action in operation, accessibility to all parts and a rugged construction were included.

A new top for open-top housing mills also was developed during the past year, which greatly simplifies roll changing. In the new design the entire screwdown mechanism is installed on an entablature which constitutes the top of the mill. By removing four keys the entire top of the mill may be lifted off by the crane, leaving the top of the mill open. A new type of rolling mill table also was designed in 1925, which permits the rollers to be removed individually without disturbing the line shaft, or the line shaft to be drawn back, unmeshing the gears, and permitting all the rollers to be removed or freeing the line shaft so that it may be lifted out without disturbing the rollers.

Records of the past 25 years also disclose many interesting developments from the miscellaneous standpoint. During 1903 the first steel car wheel was rolled by Charles Schoen at McKeesport, Pa. Mr. Schoen, the first builder of steel cars, established the Schoen Steel Wheel Co. which in 1908 was purchased by the Carnegie Steel Co. One of the outstanding developments in 1904 was the use of high-speed steel for twist drills.

Perhaps the most striking development of 1918 was in connection with measurement of temperature at steelworks and the exact treatment of steel according to its particular requirements. Manufacturers in 1919 began, for the first time, to employ hot rolled strip steel for metal lath, while the year 1925 witnessed the inauguration of continuous annealing of strip steel for automobile fenders in electrically heated furnaces.

Machinery Goes Through Refinement Period

(*Concluded from Page* 779)

plain bearings could withstand little heat and were quickly worn out of true. During the last ten years the adoption of roller bearings has become more general. Nevertheless, there is yet some disagreement as to whether all bearings can be converted to the ball or roller type, milling machine spindles being a notable example. Due largely to the severe operating conditions imposed on bearings by the automobile engine, bearing metals have been improved and a number of new alloys have been introduced on the market. Some of these metals have assisted to solve some of the bearing problems of machine tool builders.

One of the outstanding developments of the quarter century is the wide application of individual motor drive. Even as early as 1900 some tools were constructed to accommodate the mounting of motors. Once introduced, the individual drive became popular and with electric motors being constantly improved as to power and efficiency, numerous economies were presented. All overhead shafting and belting were eliminated, resulting in a cleaner and neater installation and a reduction in power to others, greater flexibility of control, and localizing motor troubles to single tools rather than blocks of tools. For the small shop, individual motor drive is particularly desirable, but for large shops there is a difference of opinion. Some manufacturers maintain it is more economical to use the unit system in which certain groups of machines derive their power through belts from a single driving motor of high horsepower. Standardization of motors has eliminated most of the early difficulties presented by varying types of motors, voltages, speeds, etc.

Planers Use Several Motors

For the larger sizes of tools, the individual motor drive is particularly advantageous and some of our modern tools with the planer as a notable example utilize one, two, three or more motors. Here again, the all-geared drive has proved its worth since any constant speed motor could be used. More recently, however, for special uses a variable speed motor has been found highly desirable. Several planers are now so equipped.

One of the problems introduced when tools were converted to high speed units was the provision of adequate lubrication. When low speeds were employed, an ordinary oil hole and a frequent use of the oil can supplied sufficient oil. The higher speeds, however, forced the adoption of mechanical and foolproof systems to guarantee long wear and continuity of operation. For certain purposes ring or wick oilers are satisfactory, for others a pressure system of oiling is supplied, the lubricant being forced to bearings through pipes. In other machines, the oil is pumped into a reservoir at the top, flowing to bearings by gravity.

It would seem that tool construction has reached a state of perfection so far as ease of operation is concerned but another quarter century doubtless will witness a similar progress. As new models of machines have been designed year after year, some new features of control have been incorporated until today the control is pretty well centralized.

The last 25 years has seen American industry expand at a most amazing rate and, while no single factor can be pointed out as responsible for this growth, there is no doubt that one of the principal factors has been the ability of the country to manufacture goods cheaply and in quantity. The United States was not a mass production nation in 1900; in 1925 it led the world in this respect. Thus we visualize and appreciate the position of the machine tool builder in our industrial fabric.